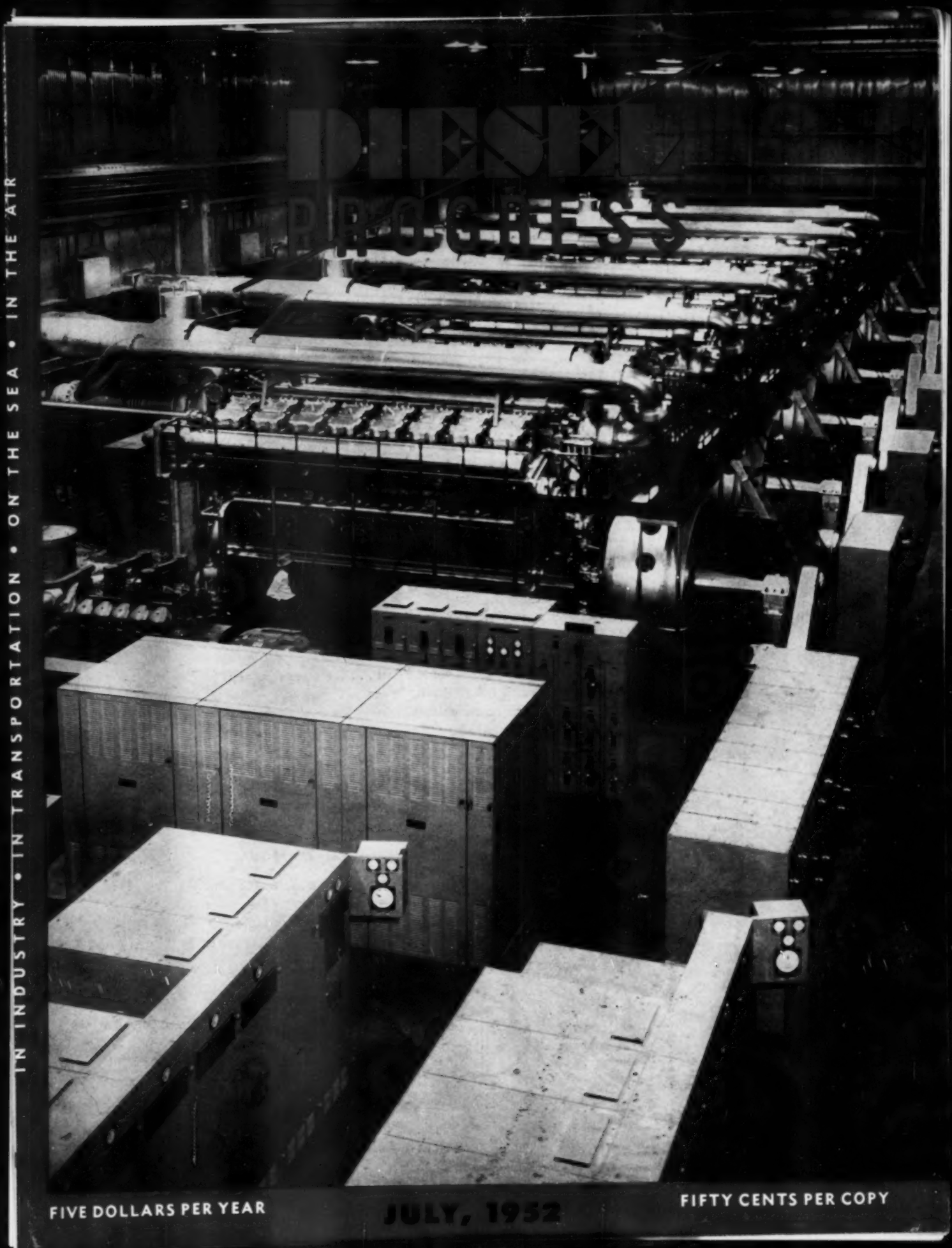

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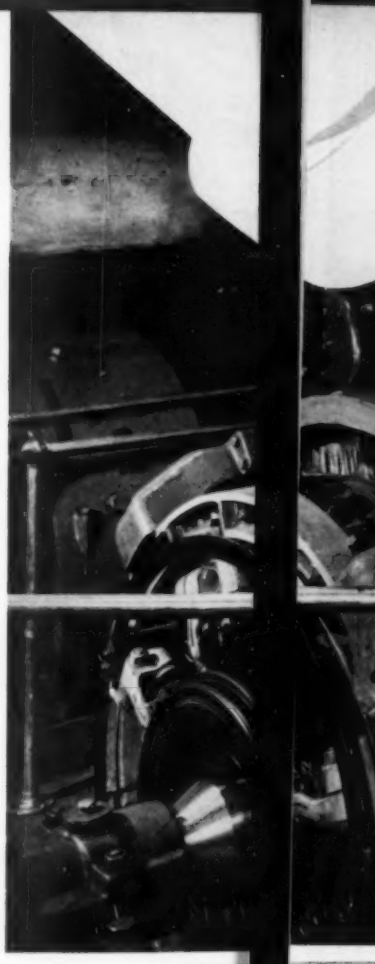
FREE RINGS FREE from high operating

assure 'em by using TEXACO URSA OIL



Rings stay free in their grooves when you lubricate Diesel, gas or dual-fuel engines with *Texaco Ursa Oil*. This means you get proper piston seal . . . better compression and combustion. Operating costs come down because engines use less fuel . . . run extra thousands of hours between scheduled overhauls.

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There is a complete line of *Texaco Ursa Oils*. Leading engine builders O.K. them and they're favorites with operators coast to coast. In fact –

For over 15 years, more stationary Diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

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DIESEL PROGRESS for July, 1952, Volume XVIII, No. 7. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy, 50c. Acceptance under 34.64, P. L. & R., authorized.

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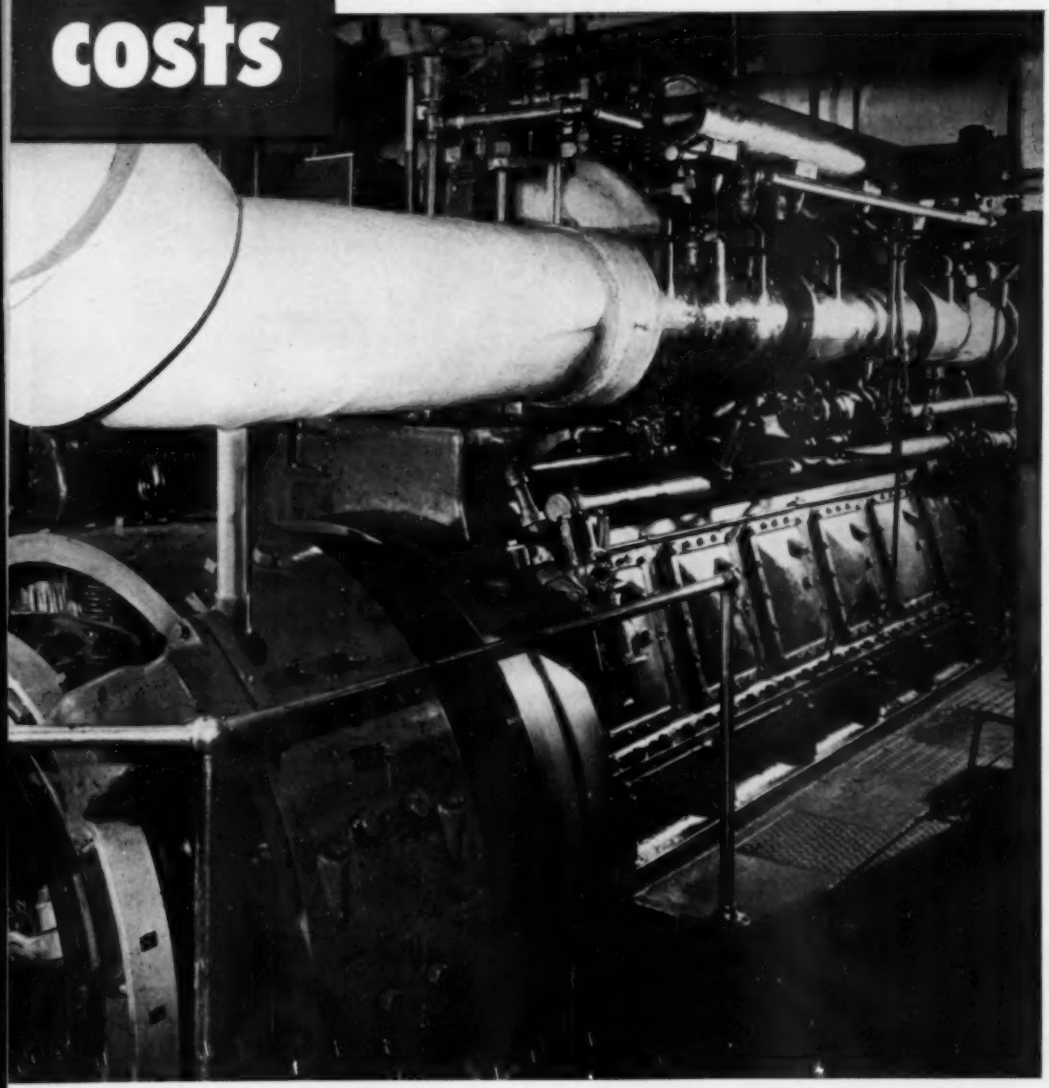

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Faithfully yours
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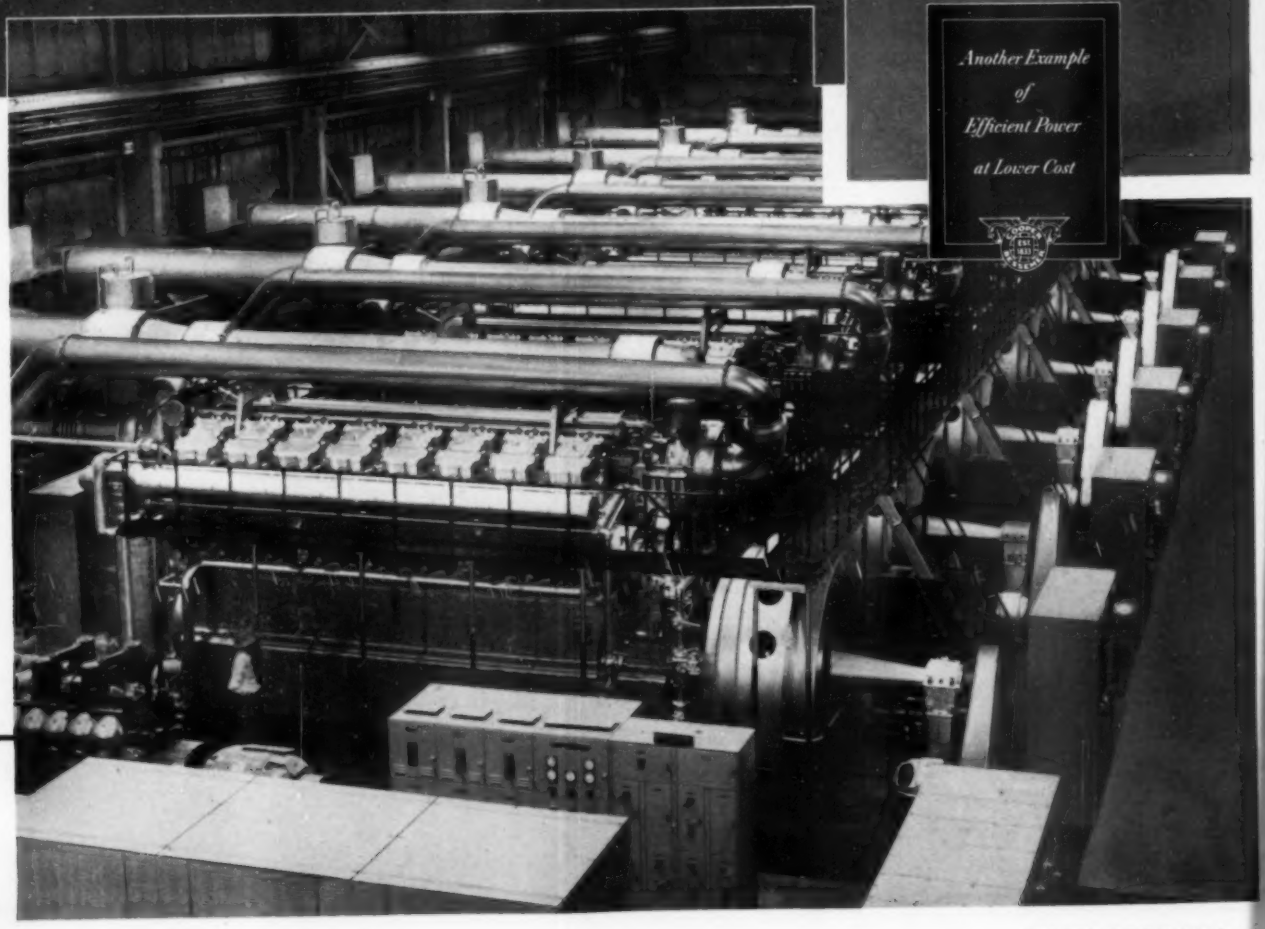
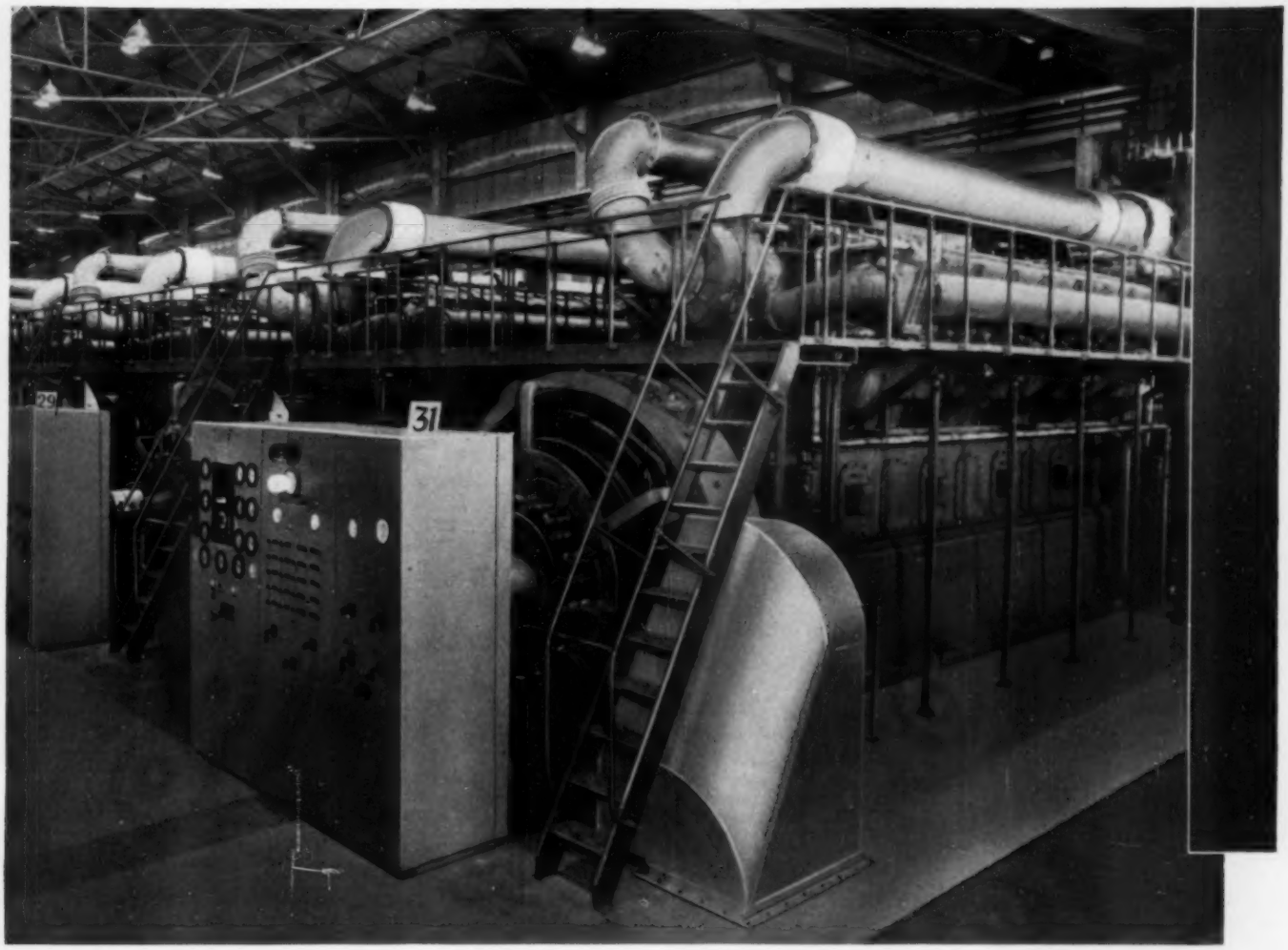
HOW REYNOLDS METALS LINED UP RECORD-BREAKING SAVINGS

-- with 155,400 Cooper-Bessemer Horsepower



Another Example of Efficient Power at Lower Cost



LEFT, OPPOSITE: Craneway view of 6 of the 9 Cooper-Bessemer LSV-16's driving General Electric A.C. generators for over-all plant service. Both these and the D.C. pot line units, 42 Cooper-Bessemers in all, are completely protected from any type of operating damage by automatic shutdown devices with suitable anticipatory alarms.

ABOVE: Line-up of 16 of the 33 Cooper-Bessemer LSV-16, 3,700 hp. gas engines, driving General Electric D.C. generators, for powering pot line No. 1 in Reynolds' new Corpus Christi aluminum reduction plant.

RECORD-BREAKING is right! There's no other electric generating facility in the United States that can match the low cost power of the Reynolds Metals Company's huge new aluminum reduction plant at San Patricio near Corpus Christi, Texas.

Shown here are some of the 42 big Cooper-Bessemer LSV gas engines that help make this remarkable economy possible. These are 3,700 hp, spark-ignited, 4-cycle, 16 cylinder *supercharged* engines — Cooper-Bessemers with a thermal efficiency that consumes only 10 cubic feet of gas per kilowatt hour. To give you a rough idea, these Cooper-Bessemers at Reynolds Metals save enough *daily* to serve a city of 25,000 population.

Add to this efficiency the fact that these Cooper-Bessemers are quiet, smooth-running engines, designed for continuous operation. You'll find that it means, as usual, exceptional economy and satisfaction plus.

The
Cooper-Bessemer
Corporation
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SELECTED FOR COOLING ONE OF THE WORLD'S LARGEST INTERNAL COMBUSTION PLANTS

Reynolds Metals Company's new aluminum reduction plant at San Patricio, Texas, has been proclaimed one of the world's largest and finest internal combustion installations. Here 83 natural gas driven Diesel engines generate 278,400 HP, and develop a total of 543,000,000 BTU per hr., which must be dissipated. Young's heat transfer organization . . . with completely integrated facilities for the design, development, manufacture, testing, rating, and installation servicing of specialized heat transfer equipment was commissioned to handle the cooling job. 83 rugged, compact, thermostatically controlled units, for cooling the Engine Jacket Water and Lube Oil, plus 84 Supercharger Air Intercoolers for increasing both horsepower and efficiency of engines, were delivered by Young. Certified Ratings and more than a quarter century of proved performance in the field assure complete satisfaction. Take advantage of this experience . . . specify that your next job is Young-engineered.

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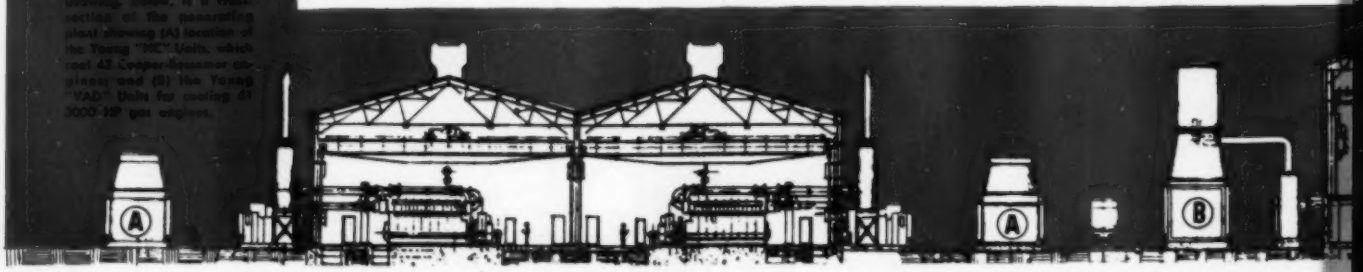
Drawing, below, is a cross-section of the proceeding plant showing (A) location of the Young "HC" Units, which cool 42 Cooper-Bessemer engines and (B) the Young "VAD" Units for cooling 41 2000 HP gas engines.

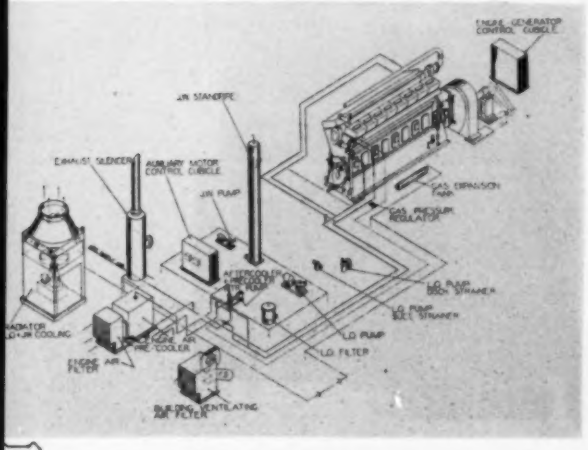


YOUNG "VAD" VERTICAL AIR DISCHARGE UNITS COOL ENGINE JACKET WATER AND LUBE OIL FOR FORTY-ONE 3000 HP GAS ENGINES

Each of these Young Units (left) consists of four, 48" x 150", vertically mounted, single pass water coils and two oil coils. The cores are of aluminum with tubes ferruled and rolled into thick header plates, secured to fabricated steel tanks. The oil cores have turbulating-type agitators which are removable to facilitate cleaning. The entire structure is rigidly mounted on concrete foundations . . . the welded steel tripod and fan assembly being mounted independently on a heavy base to isolate the cores from the fan drive. The fan structure was preassembled and aligned at the factory to speed construction and assure proper installation . . . typical of the careful attention to details, which has been a hallmark of Young Quality Service.

YOUNG "HC" HORIZONTAL CORE UNITS DISSIPATE HEAT FROM JACKET WATER AND LUBE OIL FOR 42 COOPER-BESSEMER 3700 HP ENGINES

Each Young "HC" Unit (left and right) has two 72" x 180", horizontal, single pass water coils and one oil cooling core. They are of similar construction to the "VAD" Units, above, and have thermostatically controlled shutters for top efficiency operation. Each Young "HC" Unit has electric space heaters located in the plenum chamber to prevent freezing when units are not in operation. The sturdy framework of this equipment is designed to withstand Gulf winds of untold velocity.



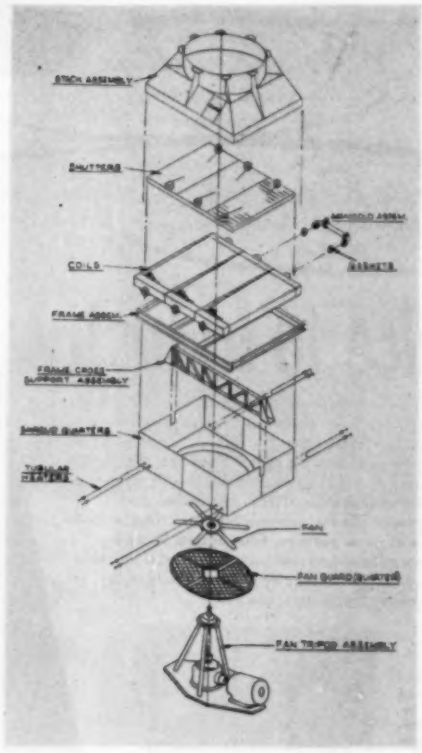
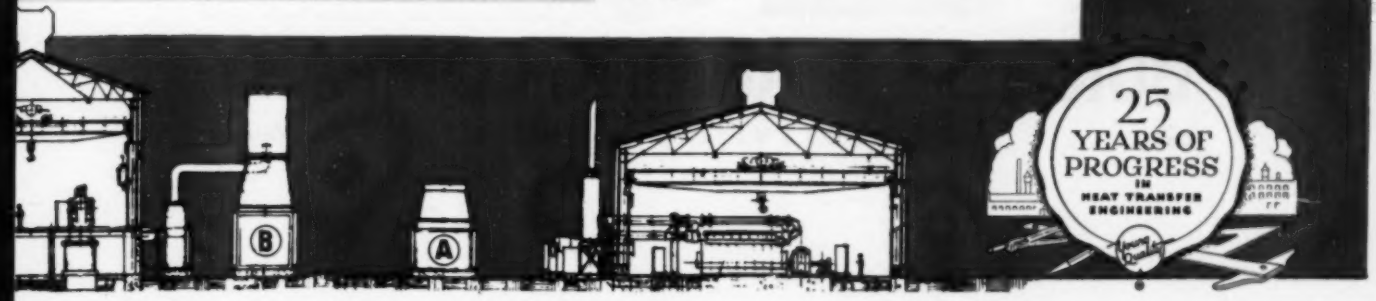


Diagram (left) shows schematic drawing of the cooling system for the 42 Cooper-Bessemer 3700 HP engines. Young "HC" Units cool the Engine Jacket Water and Lube Oil for these engines. "Exploded view" of typical Young "HC" Units is shown in the drawing above.



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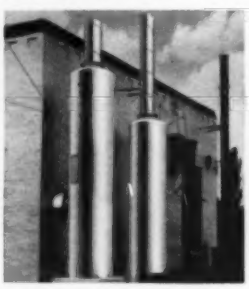
Do you have a noise problem dealing with Diesels or gas engines, jets, turbines, steam discharge, vacuum pumps, or compressors? If so, Burgess-Manning engineers are prepared to solve it for you. Extensive experience in solving these noise problems in the locomotive and marine fields, municipal and industrial power plants, sewage disposal plants, and water works is at your service. Our broad line of Snubbers permits us to recommend the most suitable unit for your particular application. Consult Burgess-Manning Engineers, today.



Burgess-Manning Intake Filter Snubber and Exhaust Snubber installed on a Fairbanks-Morse Diesel in the Municipal Power Plant at Sullivan, Illinois. There is a Burgess-Manning Snubber for every engine exhaust and compressor noise problem.

A Burgess-Manning Snubber for effectively reducing engine exhaust and compressor intake noises.

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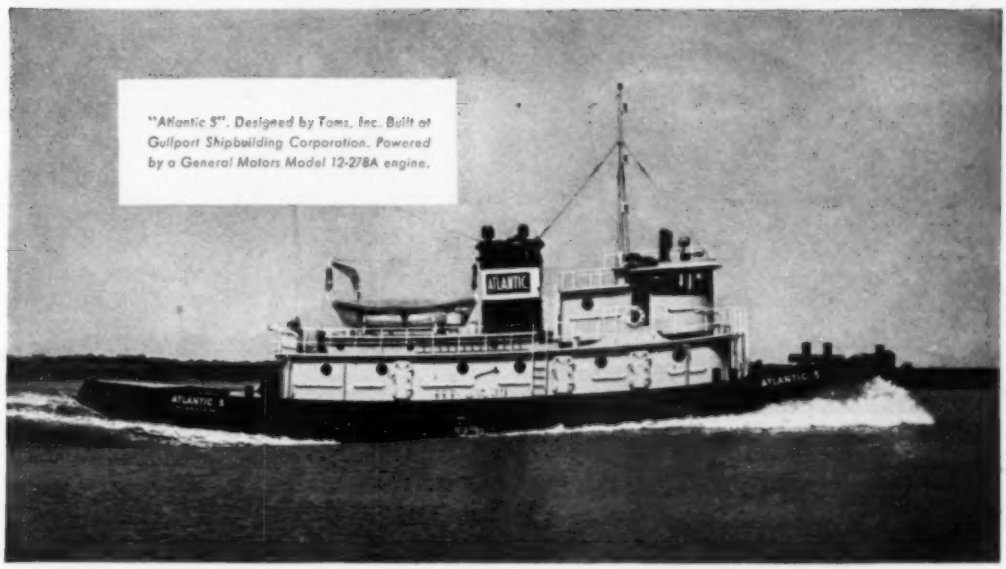

"Atlantic 5". Designed by Tams, Inc. Built at Gulfport Shipbuilding Corporation. Powered by a General Motors Model 12-278A engine.

The largest tankers ever built in the U. S. A. recently have been put in service by The Atlantic Refining Company. These tankers need powerful tugs for docking. The new "Atlantic 5" with its Diesel-Electric propulsion machinery has the power needed for this service.

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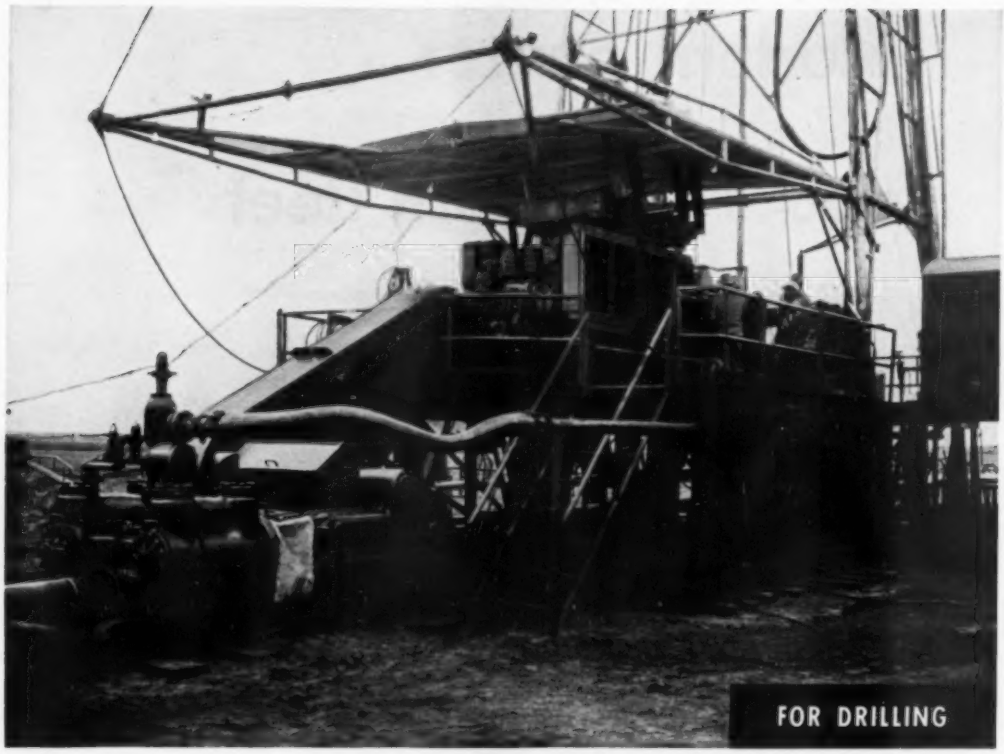

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Here's the Diesel that has changed a lot of old ideas. It has brought new standards of economy and efficiency to scores of jobs where Diesels were never used before—down to operations requiring as little as 32 horsepower.

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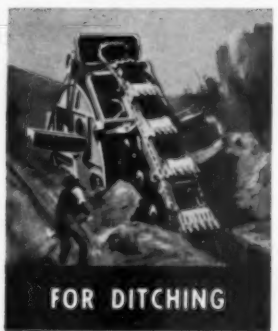

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STANDARD ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oils

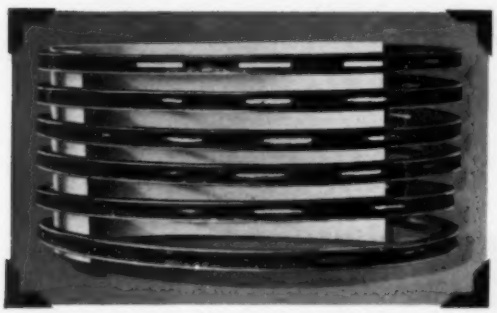
UNIT D-8 Caterpillar

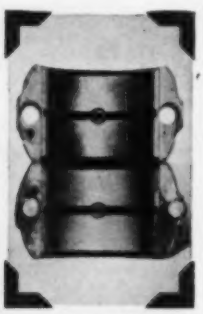
SERVICE Earthmoving contract work

CONDITIONS Heavy loads—dirt, dust

FIRM T. H. Walsh-Argo Engineering Company Los Angeles

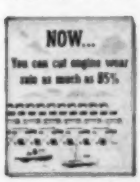
Engine parts "like new" after 7721 hours!





THIS SET OF OIL RINGS and the piston and con-rod bearing at right—all from a D-8 Caterpillar using RPM DELO Heavy Duty Lubricating Oil—appear just as they did when removed after 7721 hours of earthmoving work. There were no broken or stuck rings; the oil-return holes were open; all parts were free from deposits. The crankshaft was not more than 0.001 inch out of round at any point and was reinstalled.

THE D-8 "CAT" above is the one from which the parts came. It is one of 11 large diesel tractors operated by the T. H. Walsh-Argo Engineering Co., Los Angeles. By using RPM DELO Oils, the company regularly gets 5000 or more hours between overhauls.

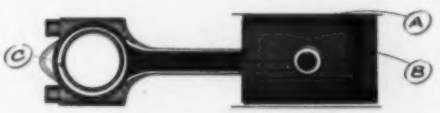


FREE BOOKLET on the RPM DELO Oils gives you complete information on how to meet any heavy-duty engine operating condition with one of these oils. Write or ask for it today.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oils reduce wear, corrosion, oxidation in all Heavy-Duty Engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.

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Used in a General Motors Diesel locomotive, this 8-ounce measure of fuel oil will haul

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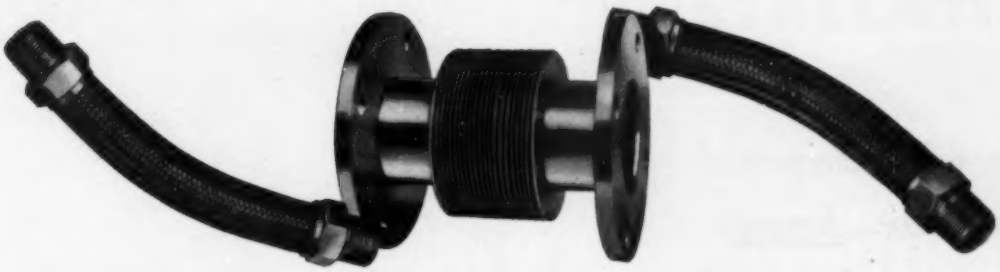
If you are interested in the conservation of fuel by Diesel locomotives, write Electro-Motive Division for a recent study.

Are these 3 new to you?



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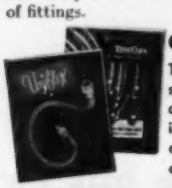
Don't let their modest appearance fool you; these are puzzle-busters and job-simplifiers extraordinary.

This is **TITEFLEX®**—*the* All-Metal Flexible Hose with 1001 industrial applications. It withstands temperatures, pressures, vacuum, vibration and the corrosive action of a host of liquids and gases. How can you use it? To connect moving parts of machinery. To connect misaligned parts. To absorb vibration, contraction, expansion and pulsation. To "transmit" vacuums or convey high-frequency currents. To shield wire and cables. And to handle difficult materials—from acid and ammonia to sea water or steam.

Here's **UNIFLEX**—the new *Helically-corrugated* Seamless Flexible Tube. It's tough, corrosion-resistant, leak-proof. And its *helical* construction gives it greater flexibility and longer life in applications too critical for ordinary concentric tubing. UNIFLEX is for you—if you're concerned with hydraulic lines, oil burners, refrigeration machinery, air conditioning equipment, pumps, compressors, diesels or machine tools. For leakless service, UNIFLEX fittings have metal-to-metal seat. Seal is produced through spring washer effect of hose on fitting body.

TITEFLEX BELLOWS are the *efficient* means of absorbing lineal movement in many types of equipment. Their welded, convoluted-diaphragm construction lets them do this without weakening the lines in which they are inserted and without reducing the flow rates of gases or liquids being conveyed. You can use TITEFLEX BELLOWS to seal high pressure valves and shafts, accommodate lineal contraction and expansion or high frequency vibration, and to handle gases and corrosive liquids under high temperature conditions. Special designs are available and complete bellows assemblies can be furnished with any required types of fittings.



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Note the helically-corrugated, seamless wall structure of Uniflex.

Cross-section shows the welded, convoluted-diaphragm construction of Titeflex Bellows.

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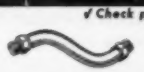

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Whatever the power application—whether it's in construction or mining, trucking or barge-towing—you're sure of a consistently reliable performance with a Cummins Diesel on the job.

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Leaders in lightweight, high-speed diesel power!

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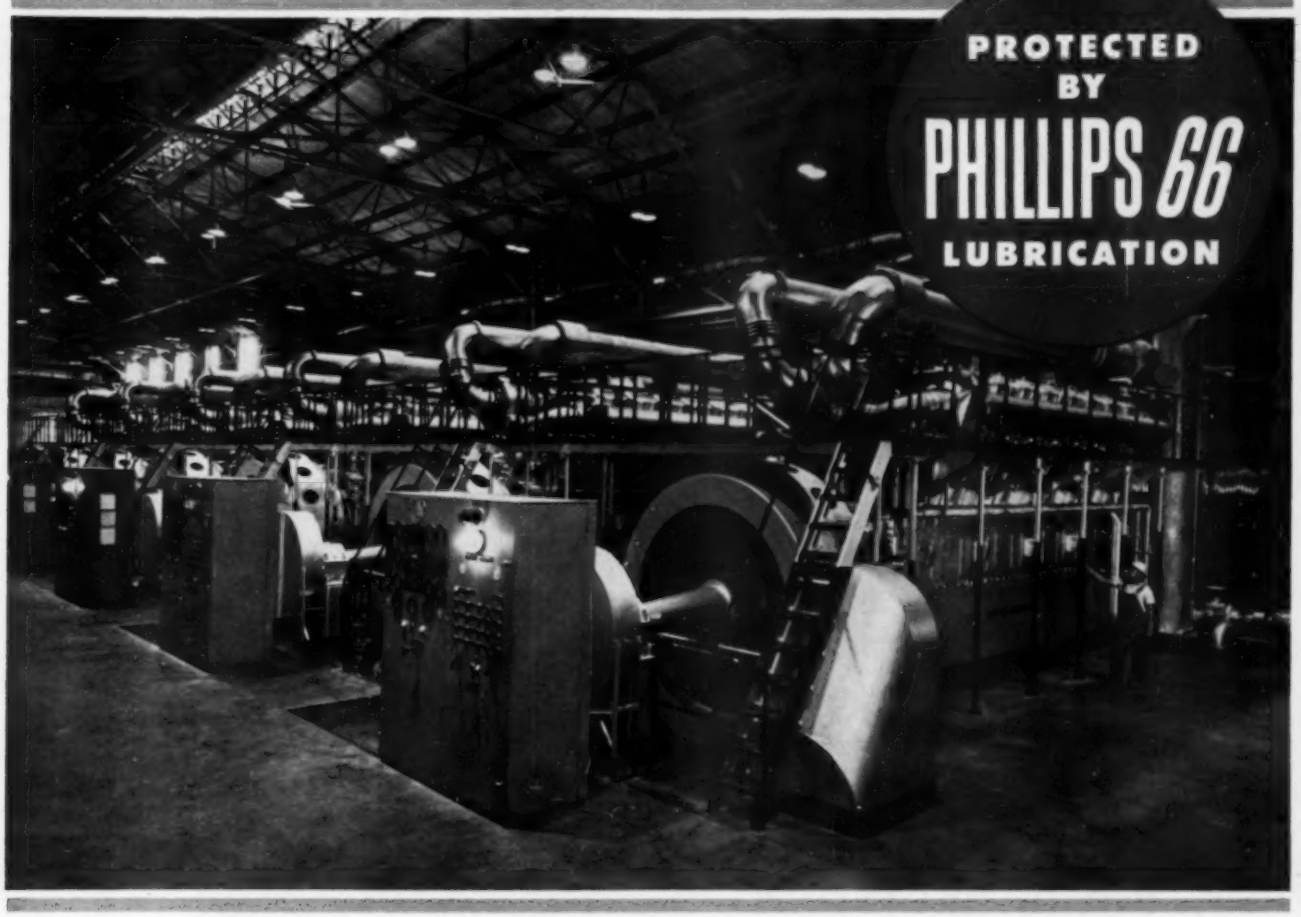
U.S.A.'s MOST POWERFUL
COOPER-BESSEMER INSTALLATION



Reynolds Metals Company's great new aluminum reduction plant near Corpus Christi, Texas, uses 42 giant Cooper-Bessemer engines, each generating 2500 kw., to produce aluminum.

A power failure which would permit cooling of the reduction pots and solidification of the melt would be costly in the extreme. To guard against such a serious possibility resulting from lubrication failure, Reynolds depends on Phillips *66* Motor Oils, and Phillips *66* Complete Lubrication Engineering Service.

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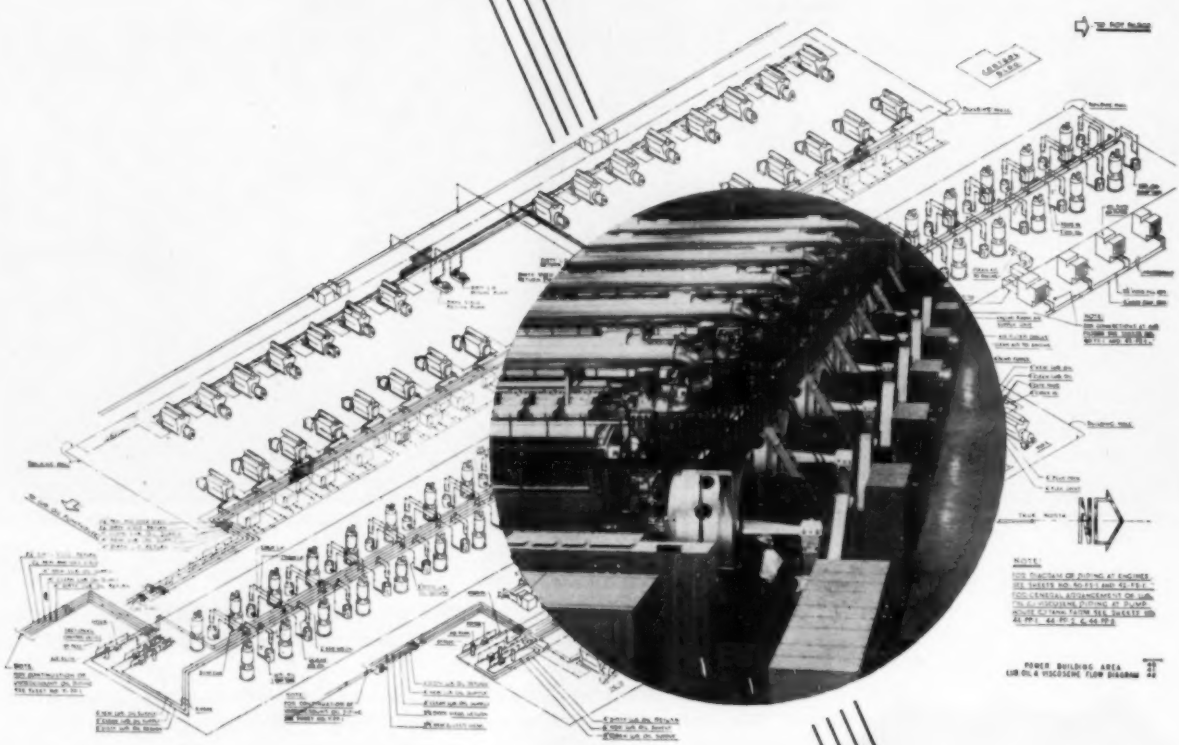
ENGINEERS - ARCHITECTS For the
REYNOLDS METALS CO. CORPUS CHRISTI PLANT



It has been a pleasure to furnish our services to the Reynolds Metals Co. in the design, construction and supervision of this modern aluminum reduction plant.

WOODWARD

TYPE UG32 GOVERNORS

The background illustration is of the Reynolds Metals Company San Patricio Plant. Woodward UG 32 Governors shown at the right control speed of the 42 Cooper-Bessemer engines.

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★ A seventy per cent increase in aluminum smelting capacity at Aluminum Company of America's Point Comfort (Texas) Works has been made possible through the installation of seventy-four additional Nordberg spark-fired gas burning Radial Engines.

This power, added to that generated by the original 120 Nordberg spark-fired gas burning Radial Engines placed in operation in January, 1950, gives the Alcoa plant a total of nearly 350,000 horsepower—*by far the world's largest internal combustion engine station.*

Here, then, is another excellent example of the way in which Nordberg Diesel Engines, in sizes from 10 to over 10,000 hp in single units, are used to provide dependable, economical power for stationary and marine requirements all over the world.

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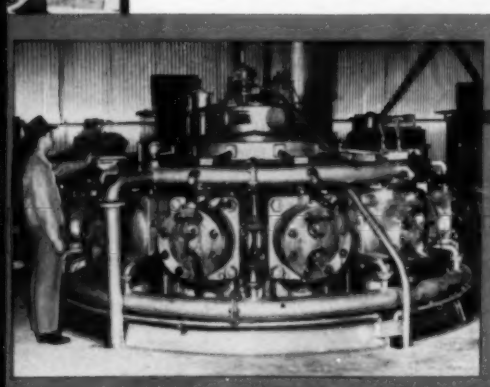

Important features of NORDBERG RADIAL ENGINES

- ☆ LOWER INVESTMENT COST
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- ☆ LESS SPACE REQUIRED
- ☆ AVAILABLE THREE WAYS . . . as oil burning Diesels, as spark-fired gas engines, or as Duafuel engines

Applicable for industrial and municipal power plants and central stations . . . wherever compact, economical, dependable power is required. For full details covering Nordberg Radials, send for Bulletin.

P652

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BECAUSE of the sale of its automotive replacement piston ring business Koppers now is in a position to further increase its leadership in piston and sealing rings for aircraft, general industrial, marine, commercial engine, railroad and oil field applications.

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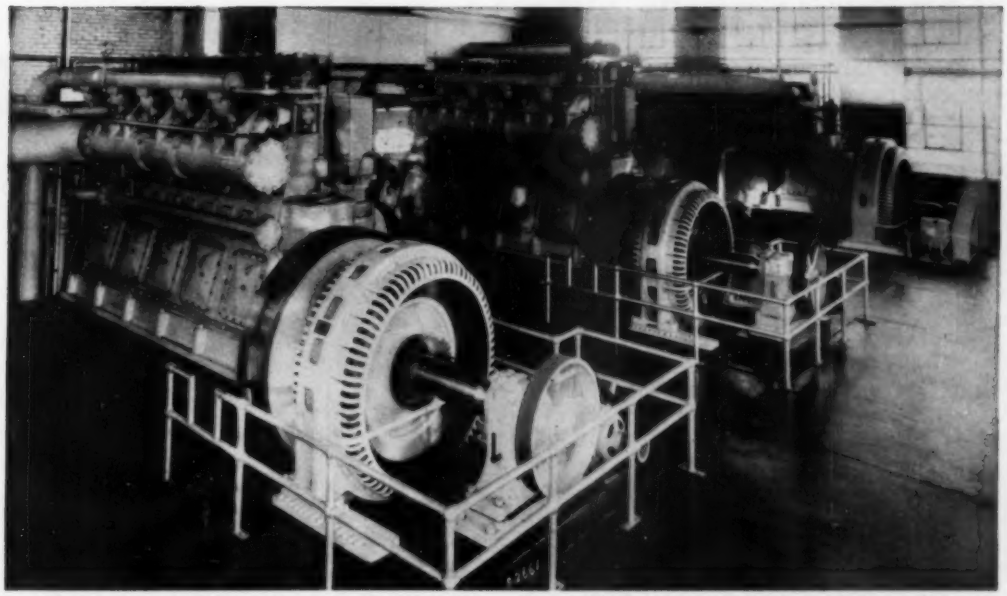


ENGINES IN FOREGROUND ARE ORIGINAL UNITS installed in 1939. Background engine is the latest supercharged unit installed in 1950. Another supercharged unit, placed in service in 1947, is not shown in this view. The output of this plant has increased from 952,600 kw hrs for the first year to 3,792,900 kw hrs for the year ending December 31, 1951.

Power plant is financial asset for city of Odessa, Missouri

PROFIT used to pave streets, pay off water and sewage bonds, operate water department, and to pay for power plant itself.

Odessa, Missouri, is an agricultural trading center 38 miles east of Kansas City.

In 1939 the town took a big step—they started operation of a power plant that has since provided the small part-farm, part-suburban community with continuous, dependable, economical power. And equally important, it brought new income that did more than pay for power plant operation.

It also helped pave the streets, pay off water and sewage bonds, and is paying off the cost of the new plant itself.

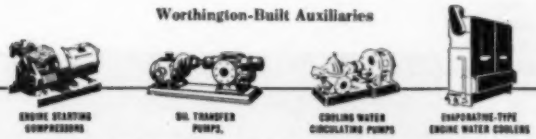
In spite of the high profitability of plant operation, rates have been lowered twice, and are today as low as can be found anywhere in the state.

Much of the credit for the success of the plant goes to the high operating efficiency of the four Worthington Diesels. After the two original units had been in service about eight years, the first supercharged engine was installed in 1947. An additional supercharged unit was placed in service in 1950. Present output of the plant is 13.5 kw hrs per gallon with a load factor of 69.5%. The two supercharged engines—at this same load factor—averaged 14.0 kw hrs per gallon.

If you are interested in learning more about how modern Diesels, dual fuel, or high compression gas engines can help you reduce your power bills, write to Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

E-2-3

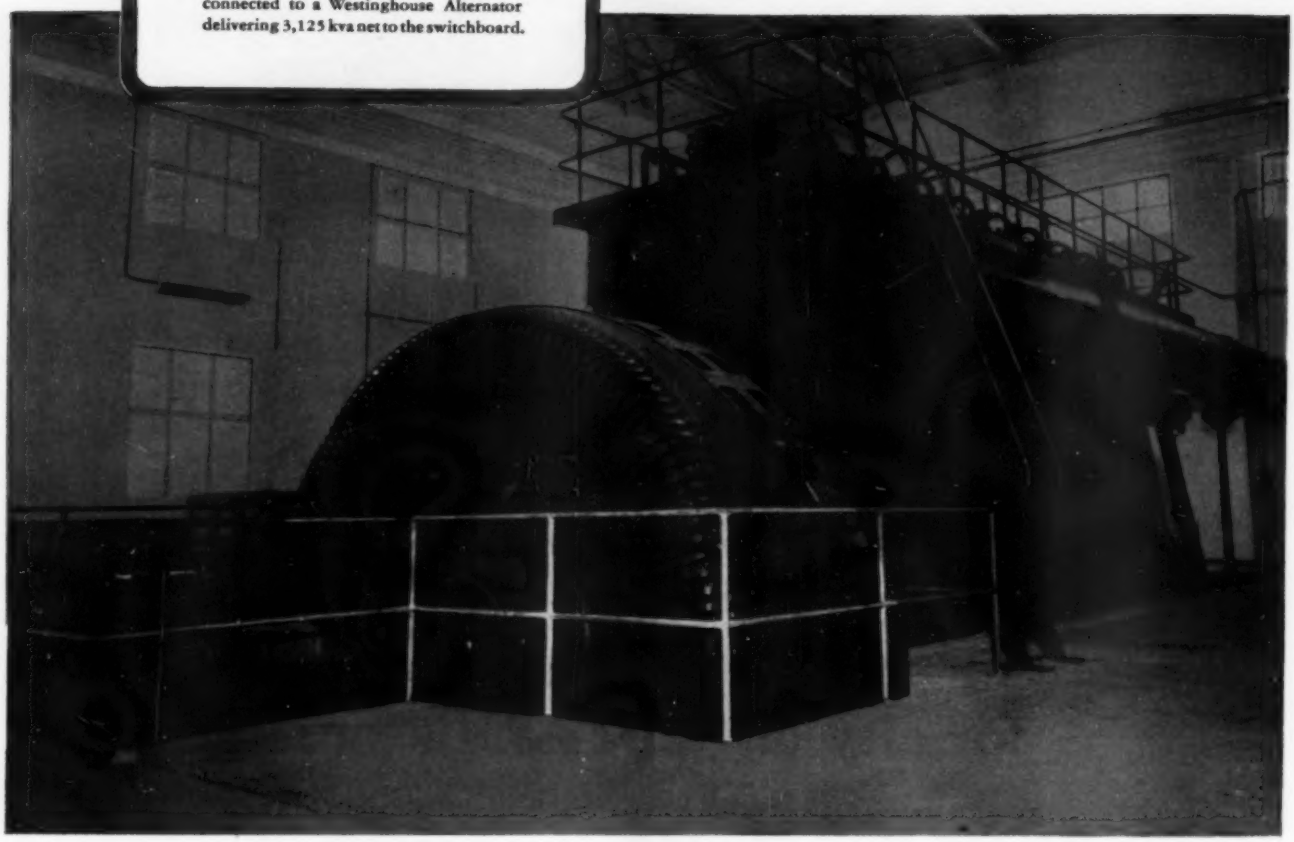
Worthington-Built Auxiliaries



Economical Continuous Power—Diesel Engines, 150 to 2,640 hp . . . Gas Engines, 190 to 2,880 hp . . . Dual Fuel Engines, 150 to 2,640 hp.

WORTHINGTON
Engines

This is the first American-made engine generator unit installed at the power plant of the Bermuda Electric Light Co., Ltd. The Nordberg Diesel Engine is direct-connected to a Westinghouse Alternator delivering 3,125 kva net to the switchboard.



This generator unit turned the tide at Bermuda

Here is the first American generator unit installed at the Bermuda Electric Light Co., Ltd. Prior to 1939, all the generating units were of British make. This unit changed the pattern . . . consisted of a Westinghouse Generator and a Nordberg Diesel Engine. The outstanding performance of this unit was responsible for another similar installation in 1950.

Westinghouse Generators create such acceptance because of their reliability—long life—performance. Once you specify Westinghouse you'll always specify Westinghouse. Take the fabricated steel rotor . . . it has been designed with such a high factor of safety that it is practically unbreakable. The all-steel frame makes possible a stator assembly having maximum strength and the permanent tightness of core that is necessary for a quiet, smooth-running machine. Electrical efficiency is tops, too . . . materials are so proportioned that the maximum efficiency of conversion is obtained from three-quarters to full load.

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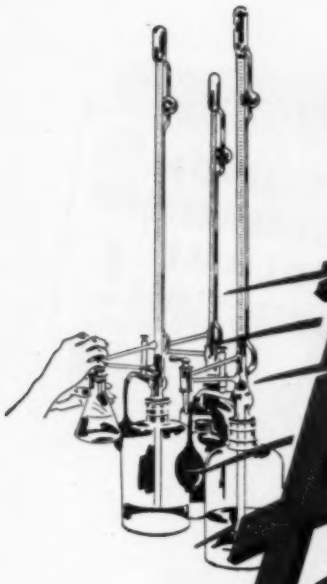

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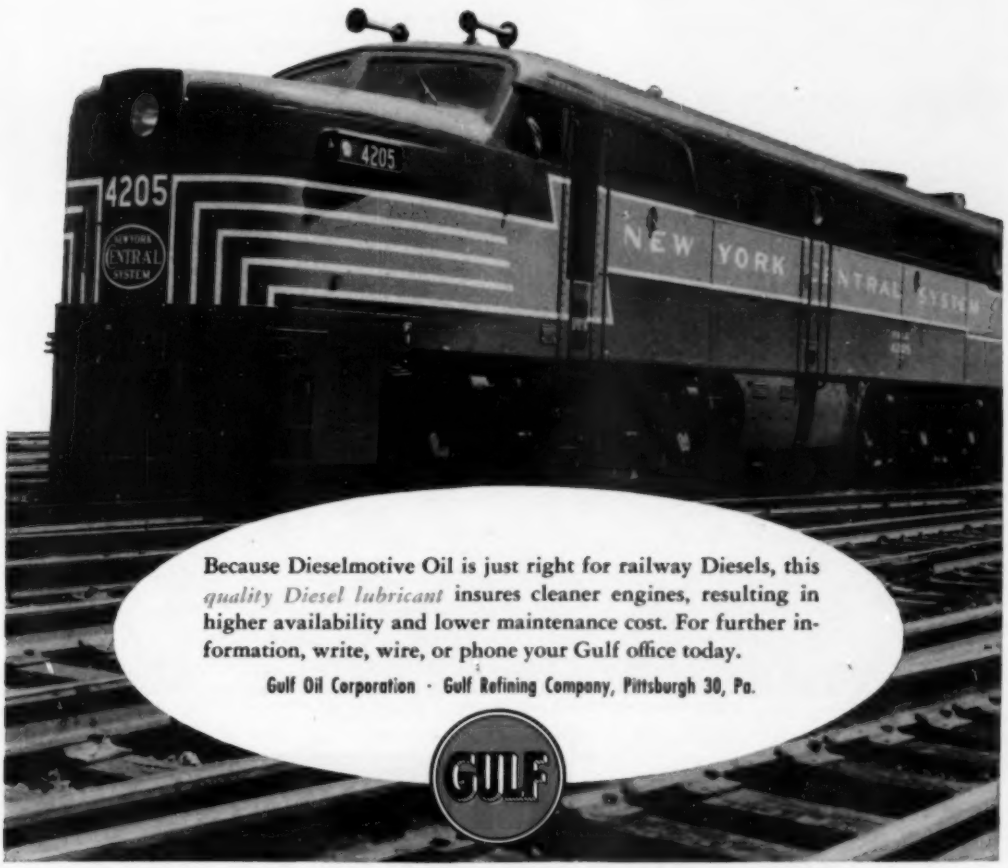

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GULF

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Versatile TD-14A handles a variety of jobs for Oklahoma quarry with power to spare

In and around this Tulsa quarry, an International TD-14A is a "man of all work" for Anchor Stone & Materials Company.

The TD-14A strips the overburden, cleans up after shooting, manicures the stock piles, and builds roads for the trucks. It tackles every phase of the tough quarrying job with power to spare.

Operator Ray Pitcock is mighty proud of his TD-14A. Here's what he says about it:

"This TD-14A sure is a slick little crawler. I've rolled dobbys weighing as much as 15 tons out of the way to make truck roads. Plenty of power—and I work this tractor eight hours a day with ease."

Want to know more? See your International Industrial Distributor—and put International "power that pays" to work for you.

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TIDYING THE TABLE. International's TD-14A shoves shot rock over the edge of the slab as easy as you clean crumbs from the table.

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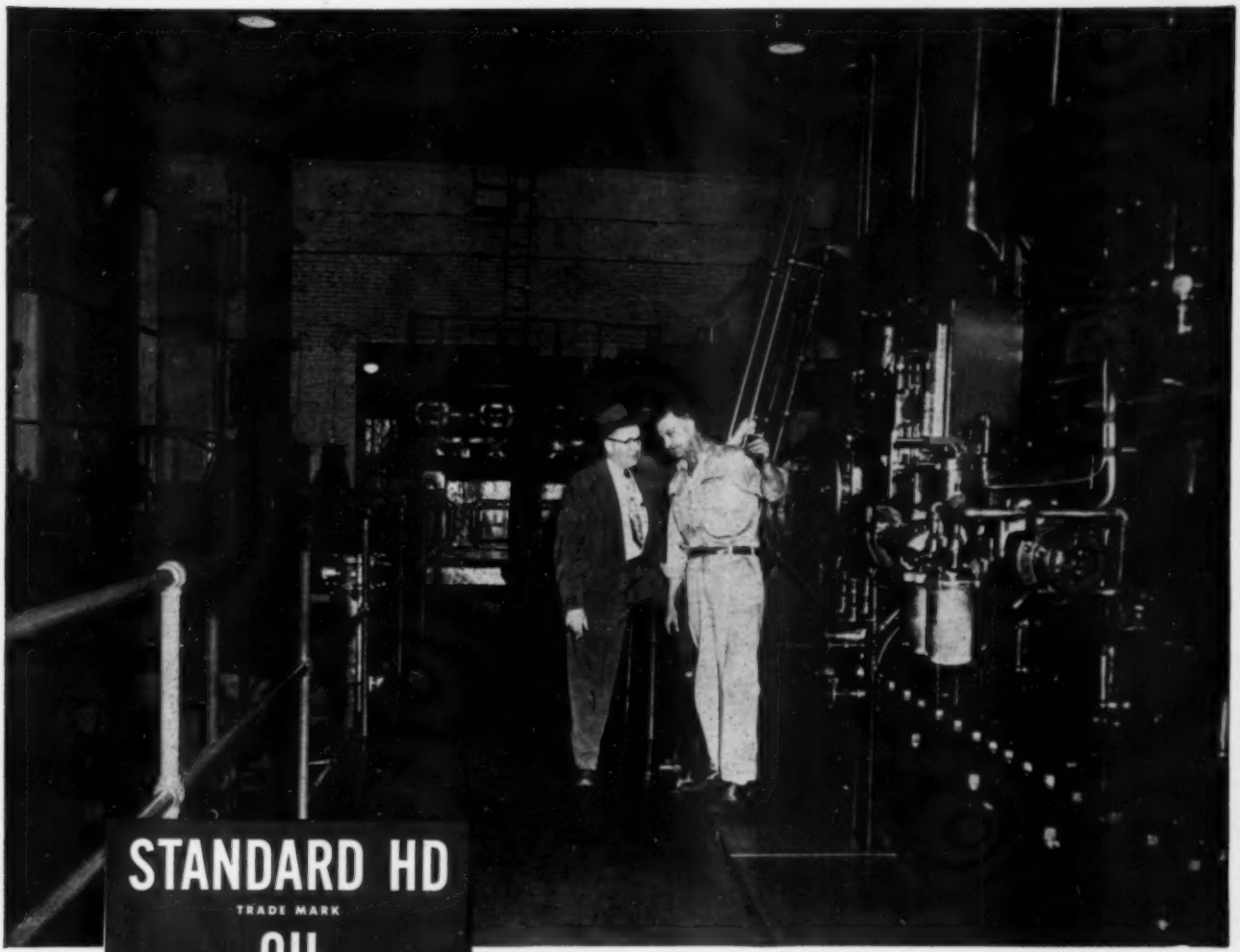

Solves a diesel maintenance problem

• Excess cylinder and ring wear plus sludge, varnish, and carbon deposits posed a costly maintenance problem for operators of this municipal power station. Overhauls were scheduled every six months. A full set of rings was installed at every overhaul. That was the situation in 1947 when a Standard Oil lubrication specialist recommended changing to STANDARD HD Oil.

The change was made on one of the station's five diesels. These are the results with STANDARD HD.

Time between overhauls has been doubled, and normally only the two top rings are changed. Cylinder wear has been cut to a minimum, even with the engine operating under heavier loads. The engine has remained clean and there has been no ring sticking. Efficiency has been stepped up from an average of 12.0 KW per gallon of fuel to 12.5 KW per gallon.

These results, the solution of a costly maintenance problem, have led to the use of STANDARD HD Oil in the station's four other diesels. Chances are that a Standard Oil lubrication specialist can help you achieve similar results in the operation and maintenance of your own diesel equipment. Put him to work on your problem today. A call to your local Standard Oil Company office is all that's necessary. Or write: Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Ill.

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Marley Double-Flow with Atmospheric Section

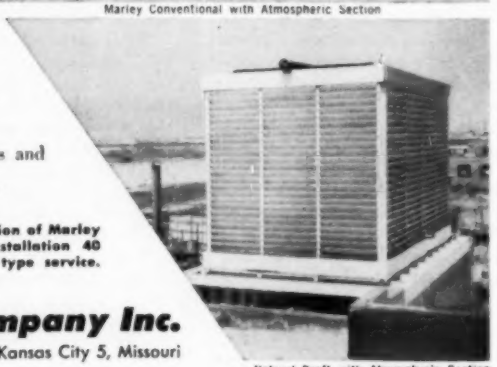
Marley Forced Draft DriCooler

Whatever method of cooling your plant requires, whether cooling medium be air or water, you'll find the finest equipment in the complete Marley line.

Marley Dri-Coolers are increasingly popular as more and more plants utilize air cooled heat exchange. The flexibility of header design and finned tube arrangement makes Dri-Coolers ideal for cooling of jacket water and lube oil and other high level cooling, either singly or both in the same unit. They now serve plants from 50 hp to 23,000 hp, in many countries and climates.

For water cooling, Marley has long set the standard. Marley patented Double-Flow, Conventional induced draft and atmospheric towers are all adaptable for indirect cooling through standard Marley atmospheric sections. Marley towers and sections are completely integrated units and the range of sizes fits every requirement of any size plant.

Marley Conventional with Atmospheric Section



Natural Draft with Atmospheric Section

PRECOOLING AIR is another function of Marley cooling towers. In a single installation 40 Marley Aquatowers are in this type service.

MARLEY

The Marley Company Inc.

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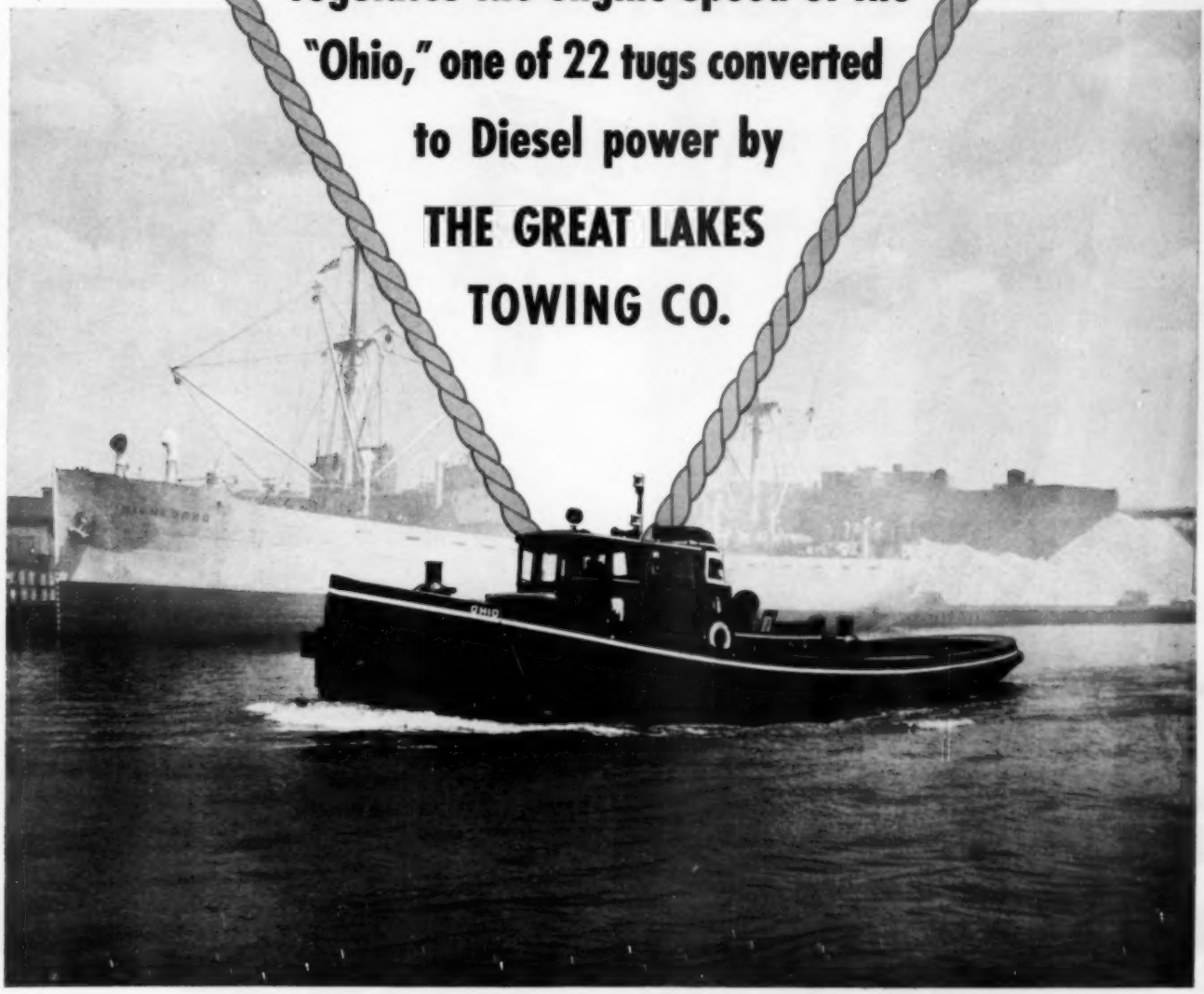
A Marquette HYDRAULIC GOVERNOR

regulates the engine speed of the "Ohio," one of 22 tugs converted to Diesel power by THE GREAT LAKES TOWING CO.



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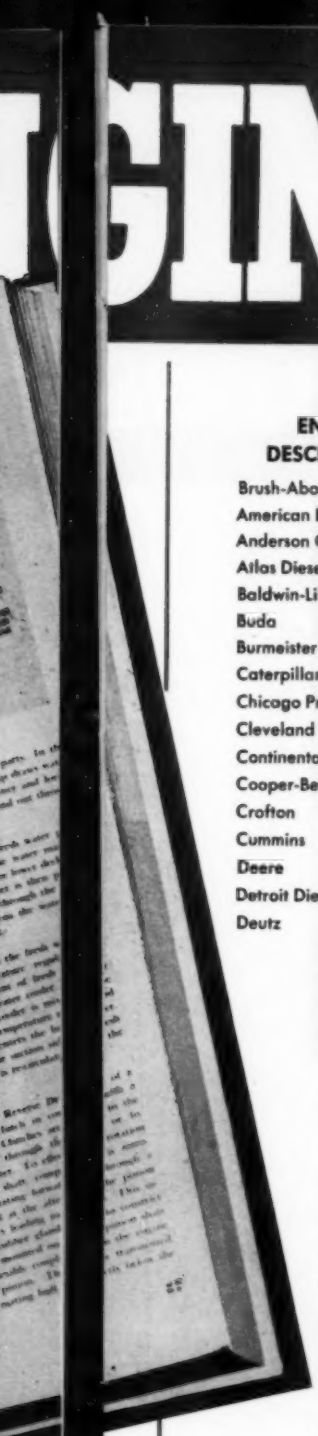

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FRONT COVER ILLUSTRATION

Alternating generating building, Reynolds Metals Company, San Patricio, Texas reduction plant, showing six of the 42 Cooper-Bessemer 16-cylinder natural gas engines installed here.

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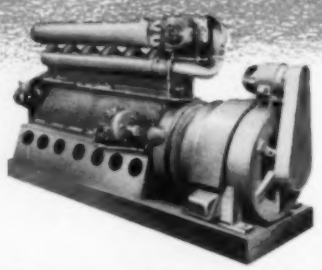
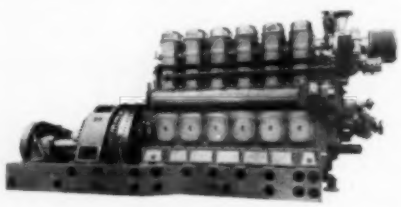


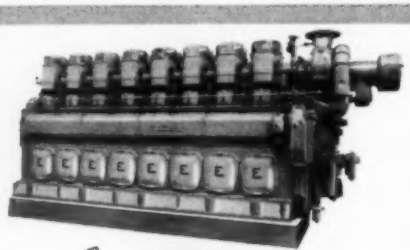
MODEL DSM-36

Enterprise M Series Diesels are built in 3, 4 and 6 cylinder models, 8" bore x 10" stroke. Turbocharging is available on 6 cylinder engine, as shown at left. Ratings in this series range from 68-400 HP at 450-800 RPM.

MODEL DSG-36

Series G Diesels, in 6 and 8 cylinders, furnish slow speed, heavy-duty power in a wide variety of services. Designed with 12" bore x 15" stroke, this series is rated 273-1388 HP at 250-600 RPM. Turbocharging available on all models.





MODEL DSQ-38

Largest in the Enterprise line, Series Q Diesels are built in 6 and 8 cylinder models, 16" bore x 20" stroke, normally aspirated and turbocharged. Conservatively rated 647-2056 HP at 250-375 RPM.

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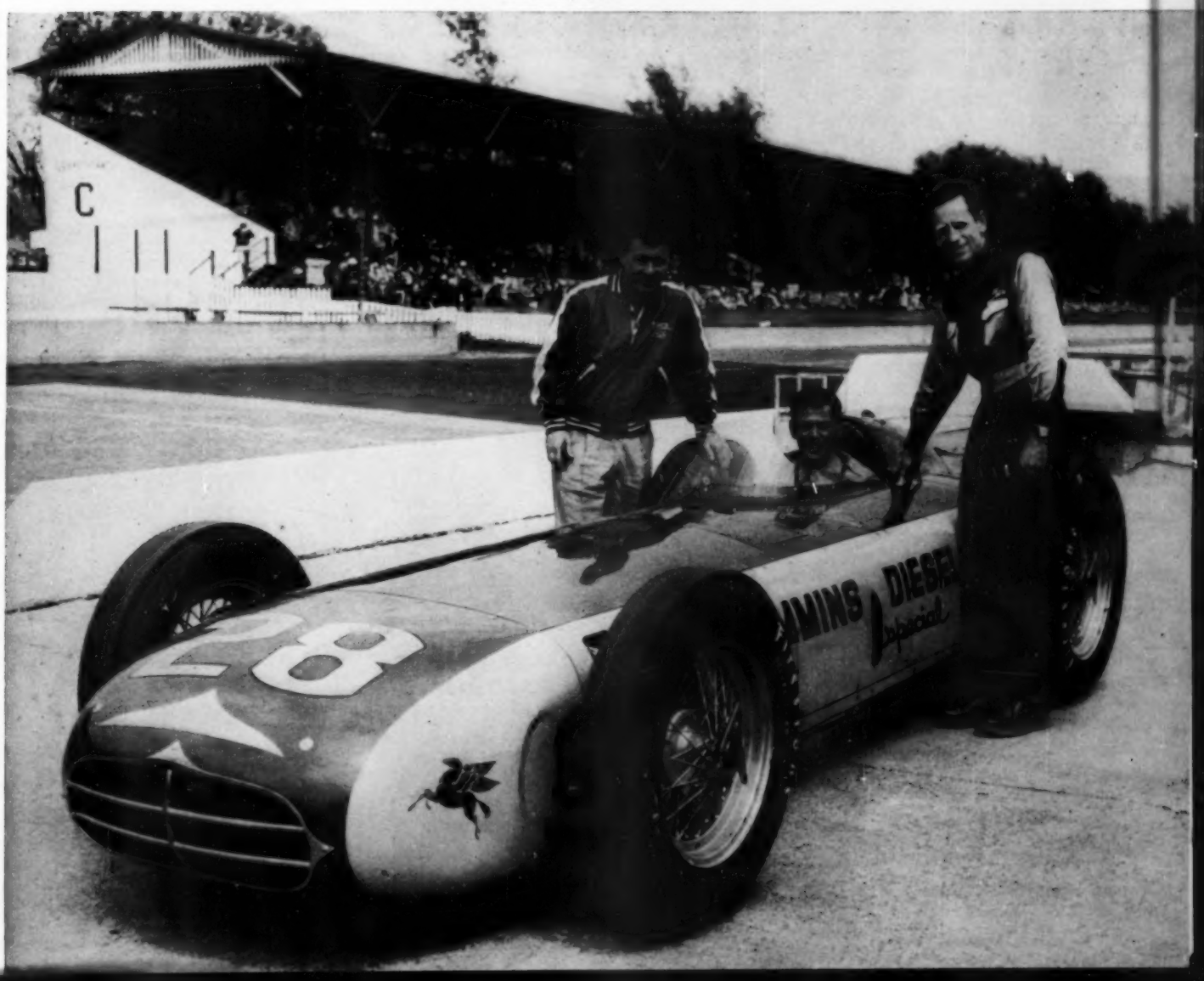
CUMMINS RACE CAR

Cummins Diesel Special Race Car, Driven by Freddie Agabashian, Runs in the 500-Mile Memorial Day Race at Indianapolis

AS was stated on page 73 of our June issue, Freddie Agabashian, driving the diesel Cummins Special, won the pole position in May 17th speed trials on the Indianapolis Speedway, establishing at the same time a one lap record of 139.104 mph., and a four lap record of 138.010 mph. Unfortunately the mechanical failure of an accessory dashed the high hopes engendered for the car by these record trial runs. After 71 laps the diesel racer was forced to drop out of the Memorial Day race. However, the outcome of the gruelling 500-mile race notwithstanding, the racing car had served its purpose in demonstrating the successful application of a diesel engine turning over at more than 4000 rpm., and the failure in the Indianapolis test will be as informative for the purposes of the engineers and designers of the engine as a more signal success might have been.

Racing engines are neither a business nor a sport in the Cummins organization. Occasionally however, Cummins engineers are asked to turn a truck engine into a racing power plant because Company officials recognize that racing is an outdoor laboratory where developments can be tested under punishing conditions and the close scrutiny of both experts and the public. And, as far as we know, the Cummins Engine Company is the only American manufacturer of commercial engines that is currently using the annual 500-mile race on the

Andy Linden, left, and Jack McGrath, right, congratulate Freddie Agabashian, driver of the Cummins Diesel Special after his record-breaking performance at the spectacular time trials on May 17th.



Indianapolis track for experimentation and improvement of their product.

Four times in its 34 years of constant high-speed diesel pioneering, the Cummins Engine Company has transformed standard diesel truck engines for engineering tests in Indianapolis Speedway races. Each time Cummins engines have dramatized diesel advances and have brought new honors to the industry. The first time was in 1931, when Dave Evans drove a Cummins diesel special, non-competitively, without a pit stop in the Indianapolis 500. His was the first, and one of few cars ever to run the race non-stop. Evans averaged 86.17 mph., and finished in 5 hours, 48 minutes, 9 seconds, one of fifteen of the thirty-three starters to finish.

Total cost of fuel and lubrication was $1.76. In 1934 two Cummins diesel specials started the Indianapolis race. H. W. Stubblefield brought his in 12th, but Dave Evans was forced out by an accident after 81 laps. Both Cummins diesels had six cylinders. One was a 2-cycle type, the other 4-cycle.

Performance and final conditions of these engines prompted Cummins engineers to favor 4-cycle engines and Cummins has built no further 2-cycle units. In 1950 Jimmy Jackson qualified a Cummins Special for the 33rd starting position at 129.203 mph. In the race he had moved up to 16th when an accessory part failure forced him out after 130 fast miles. Later, on the Bonneville Salt Flats, Jackson set the following American and international speed records for diesel cars:

Distance	*Mph.*
1 mile	165.23
5 miles	161.92
10 miles	148.14
1 kilometer	163.83
5 kilometers	164.25
10 kilometers	147.63

This year, with Freddie Agabashian at the wheel, the widespread Cummins organization hoped that, in addition to gaining new engineering laurels, victory might be possible. They produced a racer in which momentum was increased and wind resistance reduced to the point where the driver would be using his two sets of brakes as much as his accelerator. The 4⅛-in. x 5-in, 401 cu. in., 4-cycle, 6-cylinder turbocharged engine was designed to deliver in excess of 350 hp. at over 4000 rpm. Anticipated fuel consumption was 8 mpg., and but one fuel stop was planned for the car. With its 6-cylinder engine weighing 700 to 750 pounds, the car was necessarily bigger, longer and heavier overall than its gasoline-powered competition. The body of the car, the cylinder block and the heads of the experimental, horizontal diesel were cast from aluminum. All the rest of the castings in the engine were made from magnesium. The use of these materials lowered the weight of the engine considerably. Dry weight of the car is approximately 2100 pounds, while the weight with fuel and driver is near the 2800 pound mark. Cummins engineers shifted the entire drive line weight off-center to the left side of the car by installing the turbocharged engine on its side, permitting the driveshaft to run back to the left, alongside of, instead of beneath the driver. This allowed for a much lower center of gravity, and helped to curb excessive tire wear on the right front wheel in the counter-clockwise racing on the Indianapolis track.

The principal equipment on the Cummins diesel race car includes Firestone tires; the body of the car itself and the engine block by the Aluminum Company of America; the turbocharger by The Elliott Company; diesel fuel and lube oil by Socony-Vacuum; piston rings by Perfect Circle; hose connections by Aeroquip; pistons by Zollner, thrust rings by Federal Mogul; main bearings by Cleveland Graphite; connecting rods by Bohn Aluminum; oil cooler by Ross; engine valves by Thompson Products; and radiator by Young Radiator Company.

The diesel engine used in the Cummins race car is now being tested commercially in trucks on our highways. Thus a cycle nears completion: from the drawing board, through the laboratory of the Indianapolis Speedway, to the more efficient performance of everyday work by a new diesel engine.

Freddie Agabashian at the wheel of the Cummins Diesel Special on the Indianapolis track just before he completed his time trials on May 17th.

MEMPHIS ZEPHYR

ON February 20, 1952, a milestone was reached by the St. Louis Shipbuilding & Steel Co., when its 100th towboat, the *Memphis Zephyr* was christened. This powerful new 2880 hp. towboat, the third built by the Shipyard for the Streett Towing Company of St. Louis, joins the ranks of the many outstanding boats completed in the company's 19 year history. Among the most notable of the Shipyard's towboats have been the *Sohioan; Valvoline; W. F. McCrady;* the two automobile carriers, the *Commercial Clipper* and *Commercial Express; St. Louis Zephyr; Fort Dearborn; Celeste; Claude Tully; Fort Jackson; LaCrosse Socony;* and the now famous *Delta Cities.*

The new *Memphis Zephyr* is 156 feet in length with a beam of 35 feet and a draft of 8-ft. 0-in. Propulsion is through two National Supply Co. Superior, supercharged diesel engines, each developing 1440 hp. at 360 rpm. The 8-ft. 6-in. diameter cast steel propellers turn at 180 rpm. through 2:1 reverse-reduction gears provided by Universal Gear Corporation. The all welded steel hull is constructed on the longitudinal and transverse framing system. The lines fair aft from a model scow bow to two well rounded tunnels. The bottom and side plating is 3/8-in. increased to 1/2-in. in way of the bilge and tunnels. All bulkhead plating is 5/16-in. with both vertical and horizontal stiffeners. The *Memphis Zephyr* is built to the highest classification of the American Bureau of Shipping for river service. The deck house is of 5/16-in. steel plate construction, providing modern quarters, mess and galley, for a crew of twenty men. The spacious pilot house is equipped with the most up to date marine equipment including RCA radio-telephone and radar and controls for steering, main engines, searchlights and air horn. The extremely spacious soundproofed engine room, with well laid out machinery, is an outstanding feature of the *Memphis Zephyr.*

The Superior main engines are Model 80-MX-8, 14 1/2-in. x 20-in., supercharged, each rated at 1440 hp. at 360 rpm. Drive is through Falk #220 Steelflex Couplings and Universal Gear Corp. Model R18-A marine reverse-reduction gears to 9-in. diameter forged steel propeller shafts. Westinghouse Air Brake pneumatic controls afford complete maneuverability of the engines from the pilot house. Cooling of the main engine is accomplished by circulating the jacket water through the highly efficient St. Louis Shipbuilding & Steel Co. closed duct skin cooling system.

Electric power is provided by two Caterpillar Model D13000 Marine Engines driving Burke 75 kw. 220 volt, 3-phase, 60-cycle ac. generators and one standby Caterpillar D-311, 20 kw. 220 volt, 3/60 ac. generator set. The generators as well as the main engines use the skin cooler for circulating water. Lube oil filters by Briggs and lube oil coolers by Graham. Two Gardner-Denver, type ABC, 40 cfm. air compressors furnish air for engine starting, pneumatic controls, air whistle, etc. These air cooled compressors are driven by 10 hp. Century Electric Company motors. Two fuel oil service pumps and one fuel oil transfer pump, all motor driven, are provided for the efficient transfer of fuel oil between bunker tanks and day tanks. There are two independent steering systems of the St. Louis Ship's standard electro-hydraulic follow-up type. One system actuates the Contraguide steering rudders and the other actuates the four flanking rudders. The vessel's hot water heating system consists of an oil fired automatic boiler supplying the radiators. An indirect heater in the boiler furnishes hot water for washing while an electric hot water heater serves for heating the potable water.

The entire deckhouse is insulated with 2-in. of Fiberglas where surfaces are exposed. All surfaces in the quarters, galley and mess and pilot-house are sheathed with tempered masonite. The officers' lounge is attractively sheathed with stained fir etchwood, while the overhead is panelled in a crosspatch design of combed weldwood. The deck covering in all quarters and public spaces is Armstrong Greaseproof Asphalt Tile. The modern galley is equipped with a National Refrigerators Company two compartment walk-in refrigerator and deep-freeze, a Hobart Model SM4 electric dishwasher and a Southbend #1123-50-KA oil burning range.

The powerful new *Memphis Zephyr* will be a valuable addition to the fine Streett fleet which includes the *Havana Zephyr* and *St. Louis Zephyr,* both built by St. Louis Ship, and the *Cape Zephyr* and *Alton Zephyr.*

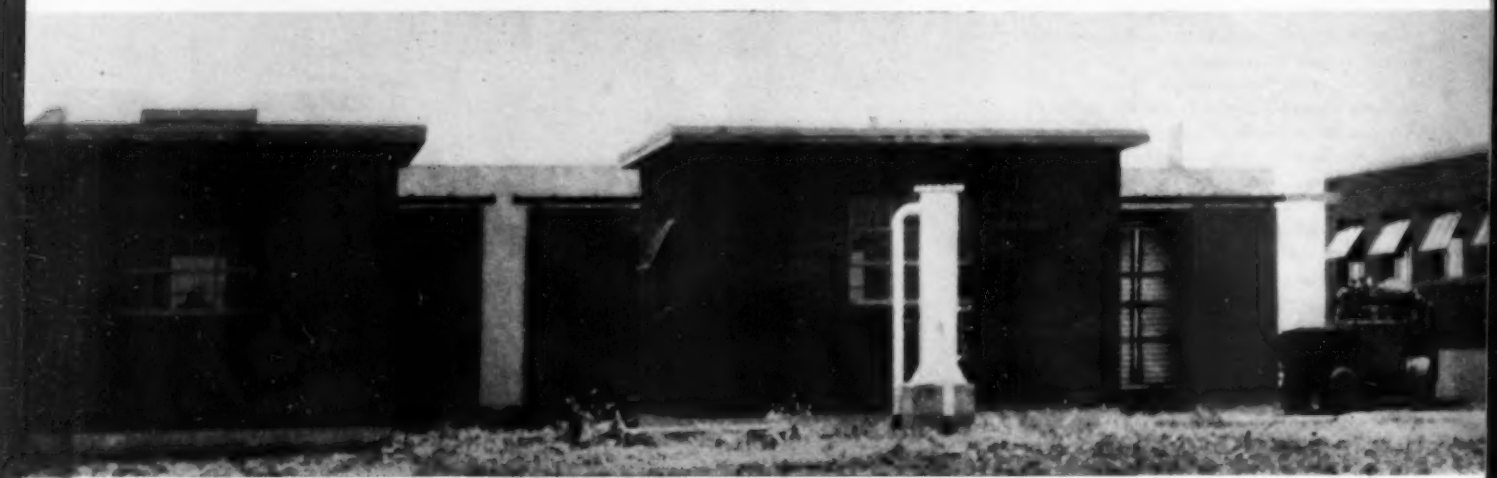
***Memphis Zephyr*, the 100th towboat built by St. Louis Shipbuilding & Steel Company; engine room of the *Memphis Zephyr*, showing the top of the two National Superior 1440 hp. supercharged diesels. At bottom pilot house with Westinghouse Air Brake pneumatic controls affording complete maneuverability of the engines from the pilot house; RCA radio-telephone and radar, etc.**

REA JACKSON, MINNESOTA

REA Distribution Co-operative Adds Duafuel Power Plant

By MARVIN J. JOHNSON*

FOR 13 years as a distribution cooperative, the Federated Rural Electric Association at Jackson, Minnesota, bought all the energy it used. In 1949, however, it was necessary to plan for additional power because of the coop.'s growing membership and the increased utilization of electric equipment by farm owners. Since suppliers of power at that time were unable to take the growing load, plans were drawn up, completed and a new plant was built just outside of Jackson, Minnesota. The modern plant with its three 1750 hp. Nordberg supercharged Duafuel Diesel engines went into full time operation on January 1, 1951 and during the first six months turned out energy at an average production cost of 5.709 mills per kwh. Land, building, other structures, heavy machinery, other equipment and furniture cost $828,199. The money was borrowed from REA on REA's regular terms of a 35-year loan at 2 per cent interest. On June 30, 1951, the distribution system, serving Jackson county and three-fourths of adjacent Martin county, over its 1806 miles of line, was valued at $2,183,477 without depreciation. Generating and distributing systems, as one entity, represented an investment of $5,011,677.



The power plant of the REA plant at Jackson, Minnesota houses three 1750 hp. Nordberg supercharged Duafuel diesel engines. A fourth identical unit is now being installed. To the left are the gas and the pump house.

This was big business, owned by 4259 consumer-members and governed by a board of directors of their choosing. If you should wish to talk about it with George Comstock, president of the board, and it was in the harvest season, you wouldn't find him in town at a slick-topped desk with push buttons but, more likely, in his oats field, five miles out from Jackson, working a tractor-propelled binder.

The engines began running on July 27, 1950. The next five months were a period of test and break-in, with part-time, unstabilized operation of units. The plant really went into full-time operation on January 1, 1951 and the Nordberg Duafuels produced significant records on performance in the following six months. In this half year, the gas-burning units produced 6,728,000 kwh., more than 55 per cent of the total volume used in the period. The rest was purchased from the Fairmont, Minnesota, municipal steam plant, 30 miles from Jackson. Operating on gas, with small quantities of pilot oil, for the first six months, except for about 15 days of cold-weather running on fuel oil only, the REA plant turned out energy at an average production cost of 5.709 mills per kwh., or less than three-fifths of a cent. This was figured on net production (gross output less station use) and includes operation, supervision and engineering costs, station labor, fuel gas, fuel oil, lubricating oil, certain operating supplies and expenses, and all maintenance. The excluded overhead costs comprised depreciation, taxes, interest, insurance, and some administrative and general costs. The excluded items amounted to 4.08 mills per kwh. The total generating cost, overhead items included, came to 9.789 mills—still under one cent.

Each of the three Nordberg Duafuel engines are of the four-cycle, supercharged type with eight cylinders of 16 in. bore and 22 in. stroke and develop 1750 hp. at 327 rpm. Each engine drives a 1230-kilowatt Elliott generator at .8 power factor. This gives the Jackson plant a total horsepower of 5250 and a total kilowatt rating of 3590. This is a unitized plant in the sense that each engine with its auxiliaries forms a complete entity; the three units could be separated by miles and each function as an individual plant. High production from the start indicated early need for a fourth engine; in fact, installation of another Nordberg had been in the plan from the outset. Identical in type with the other three, the fourth Nordberg engine was delivered in October, 1951, and is now being installed.

The three-unit plant operated at a running plant capacity factor of 55 to 70 per cent in the six-month period, or an average of 65 per cent. The output ran an average of 10,542 but.'s per kwh., burning gas and pilot oil mostly, though including some cold-weather running on 100 per cent fuel oil. For gas fuel, the plant paid an average of 23.5 cents per mcf. Peoples Natural Gas Company, Omaha, Nebraska, supplied the gas. What was the fuel oil cost per kilowatt hour of production? For the six months, a breakdown shows: gas, 2.327 mills; fuel oil, 1.494 mills; lubricating oil, .187 mills; total, 4.008 mills. This 4.008 mills forms part of the "net production cost" per kwh. of 5.709 mills, it also includes the short period of running on fuel oil only. The Nordberg engines used 1419 gallons of lubricating oil in the six-month period, at an average of 10,050 horsepower hours to the gallon.

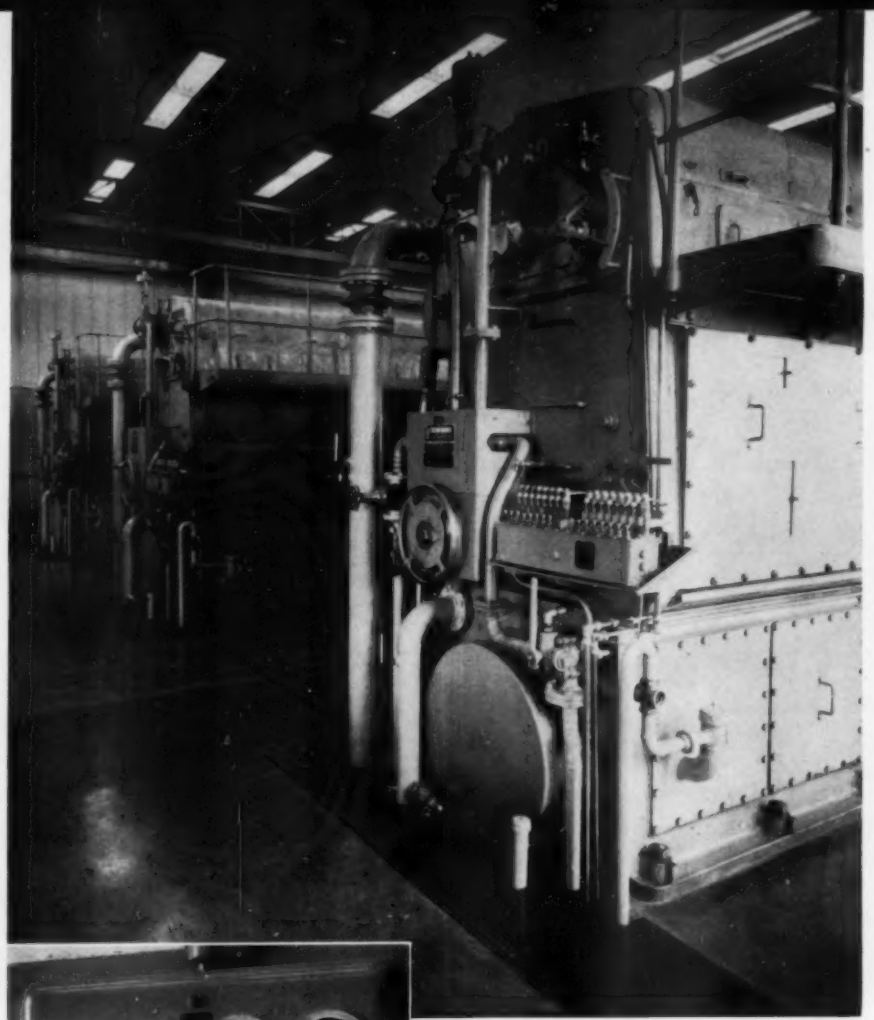
The REA plant bought 4,358,400 kwh. from the Fairmont municipal plant in the half year to raise the REA's net use of energy for the period to 11,136,600 kwh. This purchased volume was an increase of 1,958,977 kwh. over Fairmont's contribution in the like period of 1950. The fact that the daily peaks of the two plants do not coincide provides an arrangement whereby Fairmont disposes of surplus off-peak power and maintains uniformity of load. Before the REA cooperative built its own generating plant, it had purchased energy from a number of municipal power plants in its area and from a private transmission utility. With the inception of its own generating station it

*Asst. Mgr. Federated Rural Electric Association.

dropped all such outside connections except that with Fairmont. In the first six months of 1950, power purchased in the area served by the REA plant amounted to 4,963,173 kwh. and cost $67,917. The net generation of the REA plant in the first six months of 1951 was 5,901,100 kwh. and cost $57,774. This volume, if bought on the 1950 basis, would have cost $80,727. The average purchase cost for the 1950 period was $.01368 per kwh. This was

George Comstock, owner of a farm near Jackson, is president of "Federated's" Board of Directors.

Discussing generation cost problems at the Jackson plant are (left to right) P. L. Ferguson, manager of the Federated Rural Electric Association; M. J. Johnson, assistant manager and R. R. Staten chief engineer.



Operating end and side of the three 1750 hp. Nordberg Duafuel engines at Jackson. The three gas-burning units produced 6,178,200 kwh. in the first six months of 1951.

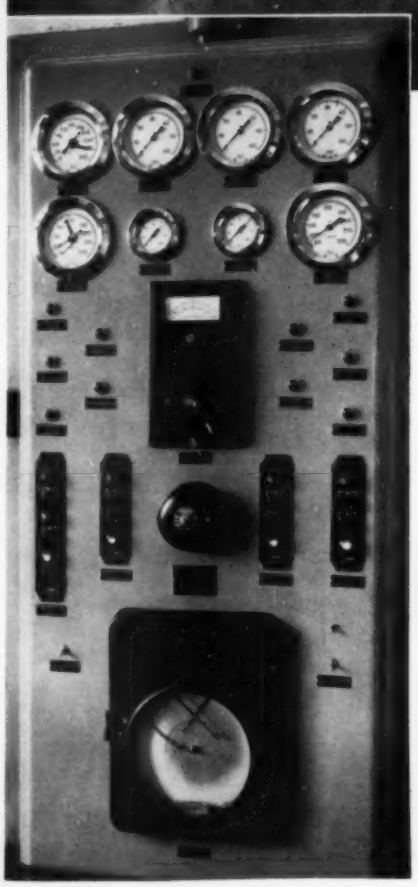
$.00389 more than the 1951 cost by generation, $.009789. By these figures, the REA plant produced energy at a saving of nearly two-fifths of a cent a kwh. over the 1950 purchased price.

Plant operators like to point out the efficiency of the engine cooling system. R. R. Staten, chief engineer, explains it: "Radiators in this system are enclosed in a building. This was done so that freezing of the radiator in winter could be avoided by closing large sliding doors adjacent to the radiator cores and having louvred openings in the top of the building. These openings can also be controlled according to outside temperature to maintain above-freezing temperature in the building.

Cooling water from the engine flows through a thermostatically controlled 3-way Fulton Sylphon mixing valve. There, a part of the 145 degree water is diverted to the radiator and the balance into the cool-water return line from the radiator. The part going to the Young vertical air delivery radiator is cooled from 145 degrees to about 120 degrees. The required quantity of 120 degree water is blended with the 145 degree water at the mixing valve and is drawn through by an Allis-Chalmers water pump, then through a shell-and-tube heat exchanger where the lube oil is cooled and then into the engine for engine cooling. With this method the make-up water averages 40 gallons a day with a water treating cost of $15.00 a month."

Henry Lundahl, a charter member of the association and a director from its beginning, is secretary-treasurer. Here is what is on his mind: From 1937 to June 30, 1951, REA allotments to "Federated" totaled $3,727,000. Of that amount $2,520,015 has been allocated. There is left a reserve of $1,255,965. Against this reserve, $290,000 has been earmarked for the fourth Nordberg unit and $140,000 for a projected 34 miles of high-voltage transmission line. Besides some of its will go for system improvements and completion of lines partly constructed. Federated has built some lines out of its own general fund (earnings) and their cost can be, of course, a charge against the reserve. No interest is paid on reserve not drawn on. Under the REA setup, the "mortgage loan contracts" which are issued against indebtedness may be paid up at any time; there is nothing "callable" or "non-callable." A cooperative can save interest by taking up its debt in any amount before maturities. Before the era of the generating plant, the distribution system had paid $353,708 toward debt retirement.

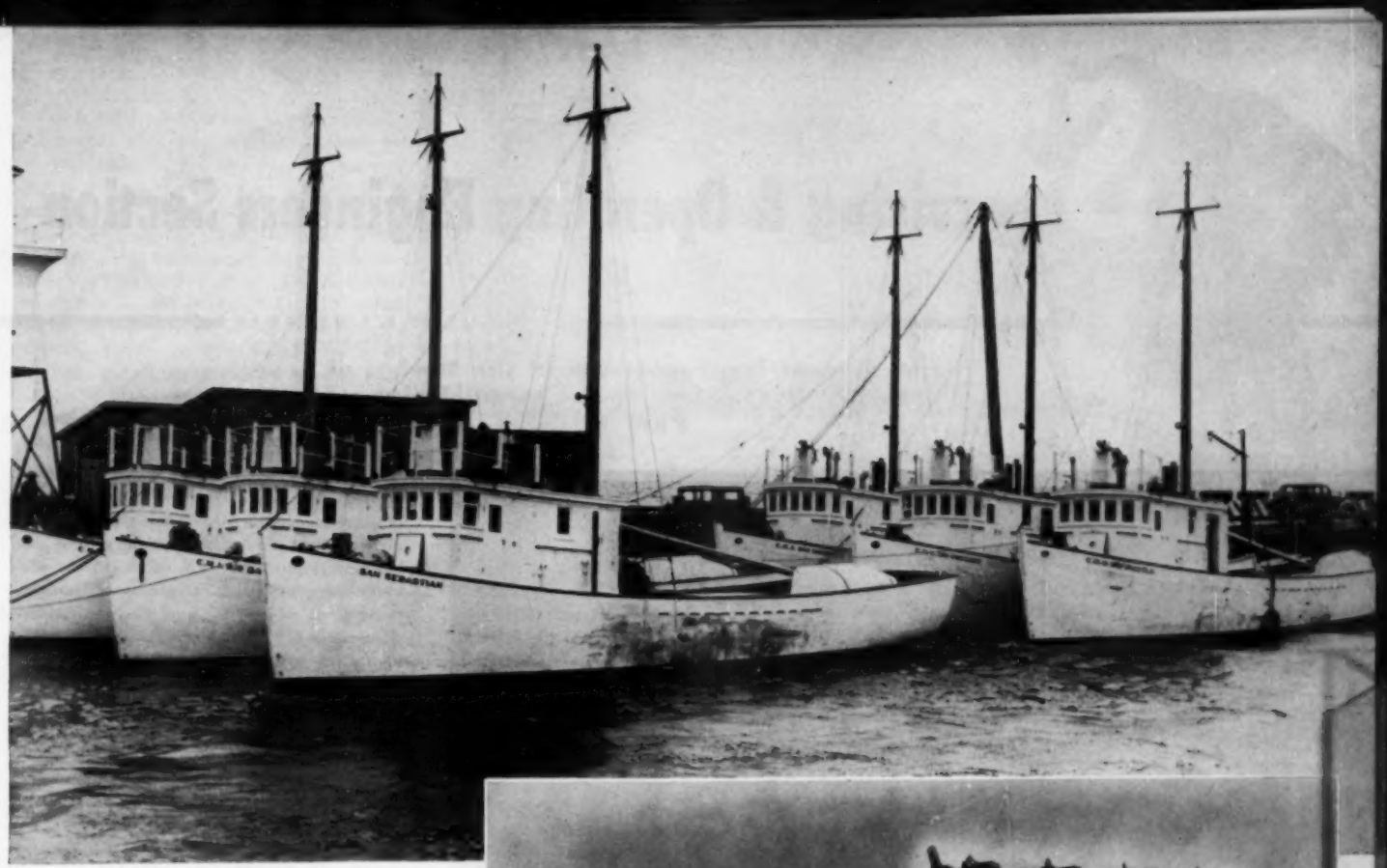
P. L. Ferguson is manager of the cooperative and this writer is assistant manager. It has been stated: "Against a three unit rating of 3690 kilowatts, the 1951 peak was 2770. The fourth unit will bring the rated potential to 4920 kilowatts. The estimated peak for 1952 is 3260 kw; for 1953 it is 3585, and for 1954, 3945. The plant's schedule calls for an expansion of the generating setup in 1954."



Identical engine control and alarm panels are supplied for each 1750 hp. Nordberg unit in the Jackson plant. Manufactured by Diesel Service Company, each panel has gauges for air, gas, jacket water and lubricating oil pressures, for water and oil temperatures, etc. Alarms are arranged to flash or sound upon any failure in pressure, temperature or the like. Note Alnor Pyrometer.

List of Equipment

Diesel engines—Three four-cycle Duafuel eight cylinder, 16 in. x 22 in., 327 rpm., 1750 hp. Model FSG-168-SC. Nordberg.
Generators and exciters—Elliott.
Governors—Woodward.
Air compressors—Quincy.
Air filters—Air-Maze.
Circulating water pumps—Allis-Chalmers.
Fuel oil pumps—Roper.
Fuel oil filters—Briggs.
Fuel oil meters—Rockwell Mfg. Co.
Cooling equipment—Young Radiator Co.
Switchboard—Westinghouse.
Silencers—Maxim.
Lubricating oil pumps—Roper.
Lubricating oil filters—Briggs.
Lubricating oil reclaimers—Hilco.
Gas meters—Rockwell Mfg. Co.
Distribution meters—Westinghouse.
Pyrometer—Alnor.
Engine control panels—Diesel Service Company.

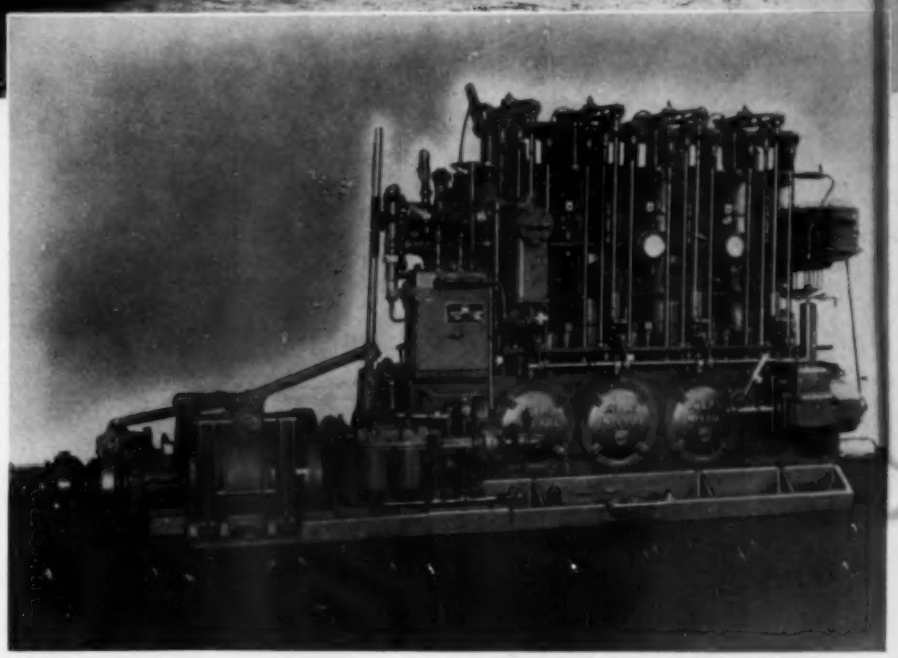


SHRIMP DRAGGERS

A 5500-mile sea voyage from a shipyard at Meteghan, Nova Scotia, down the Eastern Coast and through the Panama Canal to their home port of Mazatlan, Sinaloa, Mexico, was the recent maiden trip of six new shrimp draggers. An achievement in hemispherical cooperation, they were built in Canada by Atlantic Shipyards, Ltd., at Meteghan, Nova Scotia, for Congeladora de Mazatlan S.A. of Mazatlan, Mexico, and powered by National Supply Co., Model 38-S3-4, 4-cylinder, 8 x 10½-inch, 85/100 hp., 450-rpm., naturally aspirated Atlas marine diesel engines.

Canadian crews manned the boats and delivered them to the new owner, a recently formed company owning modern packing, freezing and storage warehouses capable of freezing 60,000 lb. of shrimp a day as well as storing 180,000 lb. of fresh and 160,000 lb. of frozen shrimp a day. Pier docking capacity can service ten boats at one time.

The new draggers are identical. They are 58 feet long, have a 16.6-ft. beam and displacement of 39.19 tons. Hull and keel are of Canadian birch, with deck and other planking of spruce. The deck house, constructed of ¾-in. marine plywood is well forward leaving the after part of each boat free for dragging operations and a hatchway. The deck house, with flying bridge on its roof, contains bridge, galley and lavatory as well as companionways to engine room and crew quarters. Fish hold is insulated with glass wool and lined with cement-coated galvanized sheet iron.



Apart from its use for propulsion, each Atlas engine also furnishes power to drive the winch or hauling gear through a power take-off clutch at its forward (flywheel) end. Winch can be operated whether vessel is in motion or not. The engine is of the reverse gear type with clutch aft to disconnect the propeller shaft when idling. At 10 cents a gallon, fuel is estimated to cost less than 40 cents an hour. Normal full-load fuel-injection pressure is set at 4,000 psi. for 85 hp.

The engine has a net weight of 11,300 pounds including the reverse gear. It is air starting with a built-in single-stage air compressor, which automatically replenishes the compressed air in the receiver while the unit is in operation. Starting can be accomplished with as low as 125 psi. tank pressure. A 3-in. cold-rolled-steel drive shaft connects the engine to the 3-blade, 42-inch diameter, 30-in. pitch bronze propeller, which drives the boat at a cruising speed of 10 mph.

For auxiliary services, a single-cylinder, 6-hp. 650-rpm. Lister-Blackstone diesel drives a 2-kw., 32-volt dc. generator for lighting etc., a 10-cfm., 250 psi. air compressor for filling starting air tanks and a 50 gpm. rotary gear pump for bilge and general service. The unit's net weight is 1,900 lb. with the three driven units which are mounted on a common steel sub-base.

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

Some Recent Improvements in the Design of Heavy Duty, Slow Speed Diesel Units Part I

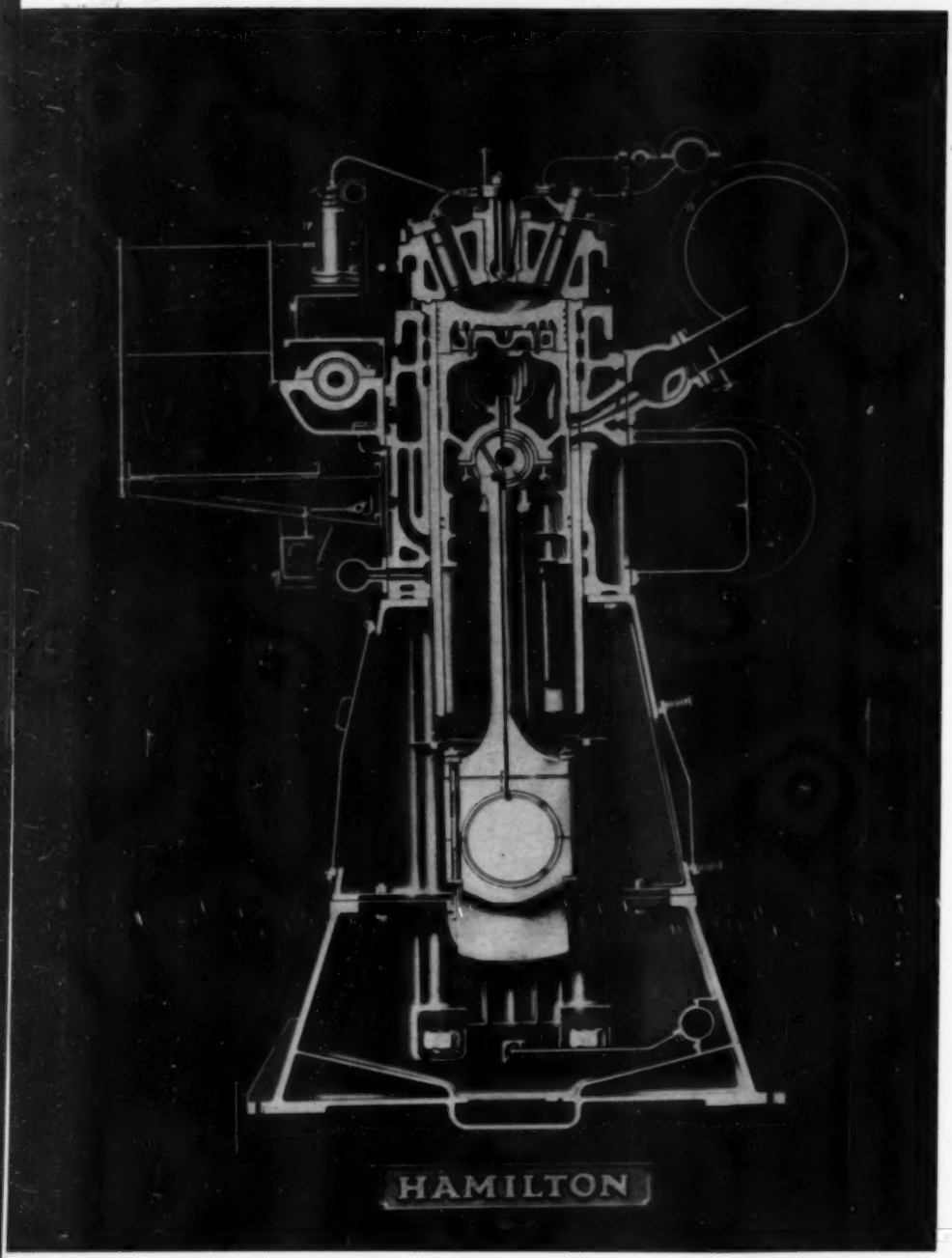


Figure 1

FOREWORD: Most of our readers are more or less aware of the constant effort on the part of diesel manufacturers to improve the design of their products with an objective in view of producing a more efficient unit, and one which will lower operating and maintenance costs. However, many of us are not aware of the progress and changes that have been made in many designs during the past few years. With this thought in mind, your writer has contacted several of the diesel manufacturers, requesting them to furnish us with material which we might present to our readers, which will enlighten them on present day trends. We are therefore pleased to present the first of a series of articles and are indebted to the Baldwin-Lima-Hamilton Company for this discussion.

The Baldwin-Lima-Hamilton Corporation and its predecessors have been building the Hamilton 21½ x 27½ two stroke cycle diesel engine since 1934 and during this period this engine has established an enviable record for economy and low cost of maintenance. In addition, throughout the years it has been manufactured, a gradual and continued improvement and development program has been in force. Within recent years, three major improvements, however, have been inaugurated in its design which have made tremendous strides toward better combustion efficiency, and increased output at no appreciable increase in cylinder pressures. Each of these three more recent improvements in design, in effect complement one another, although individually they would probably also have contributed considerably toward better performance. These steps consist of (1) an improved semi-hemispherical combustion chamber, which incorporates a flat annular area on the top of the piston crown and the bottom of the cylinder head which is reduced to a negligible volume at top dead center because of the proximity of these two surfaces. This condition obviously forces toward the center of the cylinder a large percentage of the cylinder volume as the piston nears top dead center, and as the piston approaches top dead center the velocity of this surge of air toward the center portion or combustion area of the cylinder increases during the period of fuel injection. This extreme turbulence combined with an almost perfectly shaped combustion chamber, has reduced fuel consumption in the order of nearly twenty thousandths of a pound per brake horsepower hour, as can be noted on Figure 3.

The second major improvement, more recently incorporated in the engine, has been the careful proportioning of the port areas and a detailed analyti-

cal study and design of the proper configuration of the ports and their related channels. Air swirl and scavenging efficiency has been materially improved by this redesign of the porting conditions. However, the ports are specifically designed to work in conjunction with the exclusive Hamilton scavenging systems which incorporates a rotary exhaust valve. The rotary exhaust valve is the third recent major improvement incorporated in the engine design. This valve has been designed to co-operate with both the redesigned port arrangement and the combustion chamber, to establish a correlated scavenging system in which the three major components complement the functions of one another from the time the scavenging air enters the inlet ports until the piston closes the exhaust port on its upward compression stroke.

In the diesel cycle, the primary function of the rotary valve is to entrap more air in the power cylinder than was formerly possible. The amount of additional air entrapped by the rotary valve when used in conjunction with the above described scavenging and exhaust ports is in the order of 40% more than was possible in the previously designed cylinder of this engine. Obviously, the entrapment of this additional amount of air makes available for combustion a tremendously increased amount of oxygen. This additional amount of air, however, has been carefully considered in the design of the combustion chamber and is used to a great extent as a means of increasing the clearance volume or combustion space at top dead center, which makes possible the design of the previously described semi-hemispherical combustion chamber. The availability of this air and the resulting design of the combustion chamber provide an almost ideal configuration for the combustion space with regard to both turbulence and the spray characteristics of the fuel as it is injected.

As previously mentioned, throughout the many years that the Hamilton Model 21-SA engine has been manufactured, a continuous program of improvement has been carried on. The program has included such improvements as increased bearing and crankshaft dimensions and an extremely rigid upper engine base construction of welded steel, combined with the use of large diameter steel tie rods extending from the top of the cylinder blocks to the bottom of each main bearing saddle. These improvements in design have not been provided without purpose. They have rather been incorporated into the design of the engine and tested in installations, both stationary and marine, all over the world as a prelude to a gradual increase in engine output. Their purpose has now become evident with the inclusion of the new Hamilton scavenging system and the rotary valve. Although because of precedent, general thinking has not advanced sufficiently far to entirely recognize the economic possibilities of materially higher bmep., the Hamilton engine has, however, as can be seen, been continually developed over the years towards this end and today is operating at bmep.'s 15% higher than originally and is capable of continuous and overload operation with clean exhaust and a minimum of maintenance at brake mean effective pressure 10 to 15 psi. in excess of that under which the engine now operates.

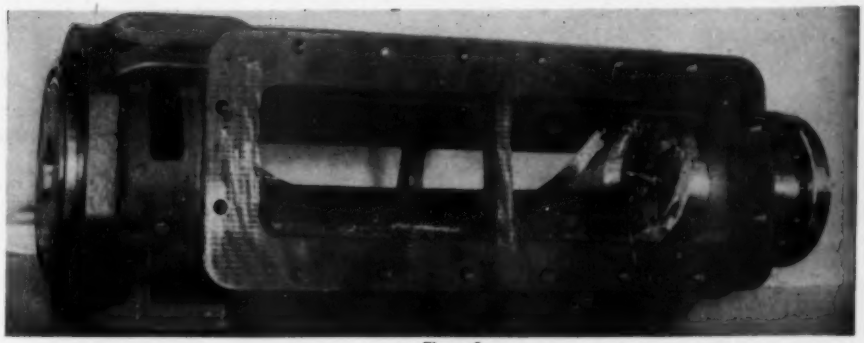


Figure 2

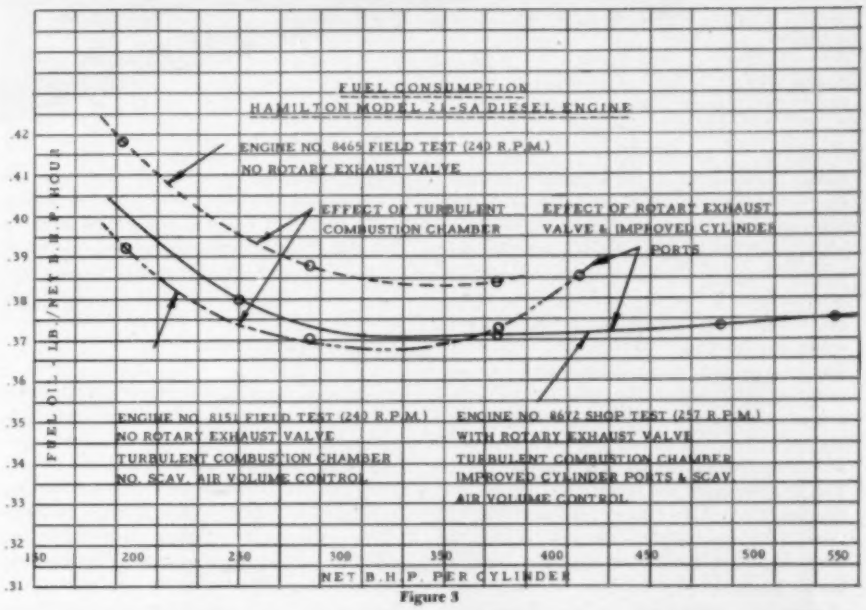


Figure 3

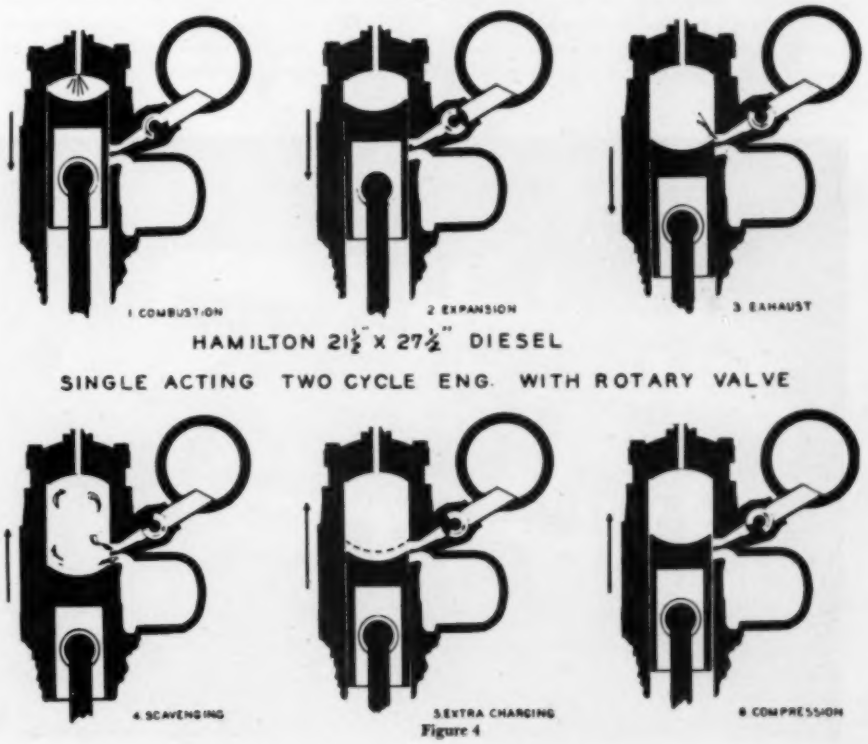


Figure 4

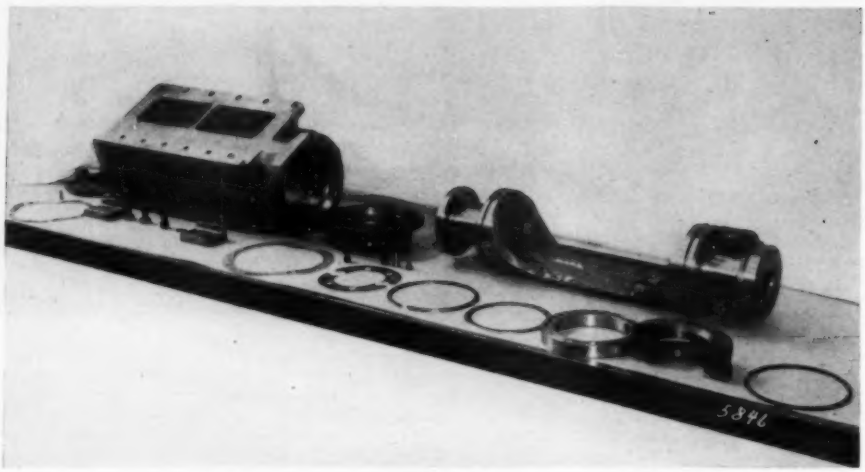
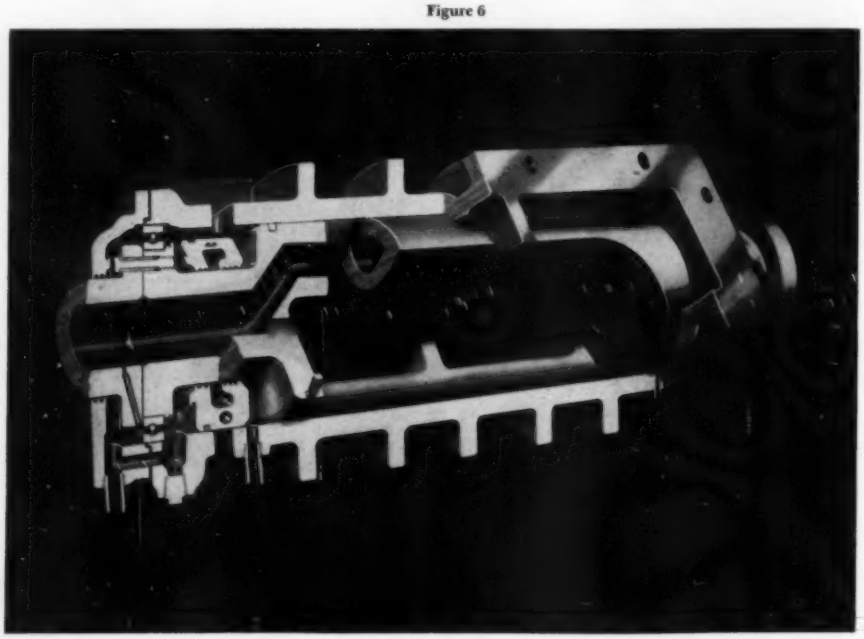


Figure 5

Within recent months, in the 4-cycle field, we have seen a rapidly increasing trend toward higher bmep., although the 2-cycle field in general has not been able to keep up with this trend because major redesign is necessary for the majority of manufacturers before increased operating bmep. can be made compatible with the performance and service requirements. Therefore, with a basic engine structure more than sufficiently strong to contain these greater outputs, the thermodynamic solution to much higher bmep.'s in two cycle operation has been made available by the above described scavenging systems and the rotary exhaust valve. The construction of the rotary valve can be seen in Figure 6 which is a cut-away section of the unit assembly for one cylinder. The valve is basically constructed of a non-cooled Meehanite housing, heavily proportioned and ribbed for the purpose of rigidity, in which rotates the welded steel valve crank. Although the crank operates with sufficient clearance so that under no condition does it make contact with the housing except at the points of sealing, clearances are sufficiently close to obviate the possibility of carbon build-up and to prevent undue leakage. Gas seal is provided by means of two piston rings which rotate with the valve crank and bear upon the Meehanite iron housing. The valve crank is maintained at an acceptable temperature by a generous flow of lubricating oil throughout its full length.

The welded construction of the valve crank is such as to result in extreme rigidity of the assembly by virtue of its heavy sections and generous radii. One ball bearing of large diameter is provided for each valve unit and lubricated by a drilled orifice connecting with cooling oil flow through the flange of the valve crank. Adequate bleed-offs are provided for both return lubricating oil and any possible gas leakage. In addition, the lubrication is confined to the bearing area by means of oil slingers and labyrinths. A split cast iron collar surrounds the valve shaft immediately following the ball bearing assembly on which a collector ring of labyrinth grooves and an "O" type seal ring is included to confine the oil to the ball bearing housing. Figure 2 is a photograph of a completely assembled valve unit except for the bearing and cover plate. The compactness of the unit can be observed from this photograph. Figure 5 is a disassembled view of a valve unit showing all of the components of its assembly.

Figure 6



In operation, all of the valve cranks are securely bolted together to provide a continuous valve shaft along the side of the engine. Alignment is provided for by carefully controlled tolerances with regard to the housing registering ledge and no thermal distortion of any consequence is experienced because of the extremely well-cooled valve crank assembly. Experience has shown no indication that the valve housing requires cooling other than its proximity to the engine block and what radiation is available from the heavily ribbed portions of the body. Lubricating oil which is fed to the ball bearing is returned to the sump by adequate piping while bleed-off pipes are provided on the low pressure side of each exhaust gas sealing piston ring and through a piping assembly connected to the engine blower inlet. This prohibits the escapement of any gas past the oil control labyrinths and its mixing with the lubricating oil or entering the engine room. The exceptionally trouble-free performance of these valves is mainly creditable to the extreme rigidity of the assemblies, the generous cooling of the valve cranks, the carefully designed gas and oil sealing principles and the fact that the mounting of the assembly is such that thermal distortions are compensated for without misalignment. Also since all of the operating mechanisms except the piston ring sealing units are provided with adequate running clearances, no wear is experienced in the operation of the unit and thereby no misalignment likely to develop after the unit has been in service even for protracted periods.

Figure 4 illustrates the rotary valves' operating sequence. As can be seen, it is so timed as to close the exhaust port as the piston closes the inlet port. This timing in effect increases the compresion stroke by 4⅛-in. as well as entraps the air which would normally flow from the cylinder after the inlet port was closed and before the piston closes the exhaust port. (At exhaust port closing the cylinder pressure is 6.4 psi. with the rotary valve as opposed to 1.4 psi. without.) The functionings of the valve in effect produces in this cylinder of 21½ in. bore by 27½ in. stroke, the equivalent air volume as that of a strictly piston port controlled engine of 21½ in. bore by 35 in. stroke. Coincidentally, from a pressure, temperature consideration, the net bmep. rating of 75 psi. given to this engine is equivalent to a 67 net bmep. for an equivalent piston controlled port type of engine. A transverse section of the engine is shown in Figure 1, illustrates the application of the rotary valve and in general the other salient features of the engine mentioned above.

Future issues will contain some of the latest improvements as worked out on other makes of diesels by various diesel manufacturers.

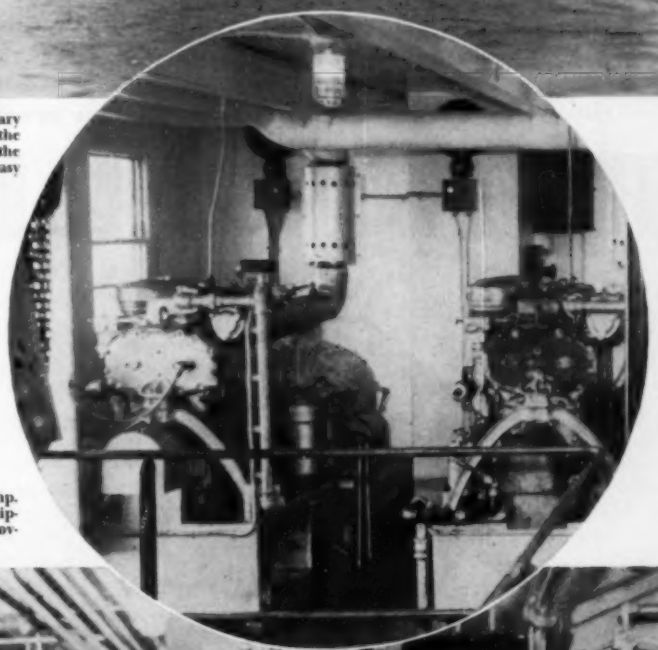
LADY LINDA

A LADY in appearance but a workhorse in performance is the twin screw towboat *Lady Linda*. The boat was designed and built for Inland Oil and Transport Co. of St. Louis, Mo., by St. Louis Shipbuilding & Steel Co., and will be used to tow petroleum products from the lower Mississippi to St. Louis. Powered with a pair of General Motors Model 12-567 diesels, driving through a Falk 2.5 to 1 reduction gear, the *Lady Linda* has 1800 hp. and is equipped with Contraguide steering rudders.

Designed for high speed towing, the boat at the present time is pushing four 195-ft. integrated oil barges, and as soon as completed, two box type barges will be added to the tow. The hull is 116 ft. long, 30 ft. beam and 10 ft. 6 in. deep with a normal draft of 7 ft. 6 in. The bow is the new St. Louis Ship Model scow type, and the stern has well rounded lines to prevent vibration.

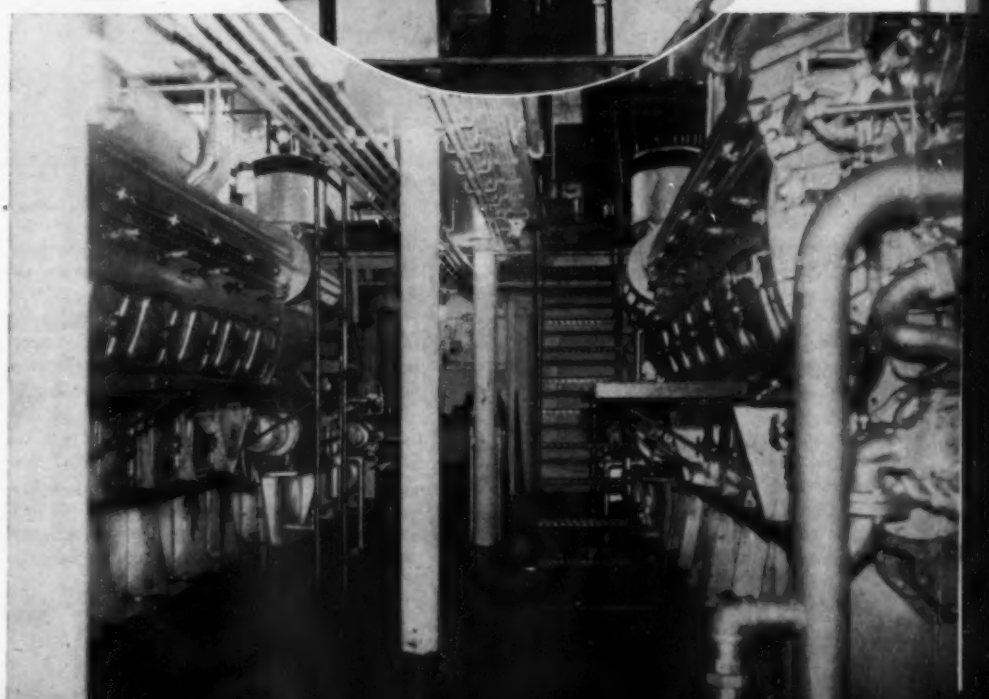
The streamlined deckhouse is very attractive and well laid out. On the main deck two rooms forward of the engine room provide quarters for four men. Aft of the engine room are quarters for the chief engineer, the assistant engineers, the cooks and the mess and galley. On the upper deck is the captain's quarters and two additional rooms for two men each. The officers' lounge is also located on the upper deck and is one of the most attractive on any river towboat. The walls are lined with walnut paneling, the ceiling is covered with Weld-Tex in an unusual pattern, and on the wall in the lounge is a colored photograph of Linda Siteman for whom the boat was named. The deckhouse is of steel construction with all outside surfaces insulated with 2 inches of Fibreglas, and all rooms except the lounge and engine room lined with ¼-in. tempered Masonite. The engine room walls and ceiling are sound-proofed and insulated with Johns-Manville acoustic transite and blanket.

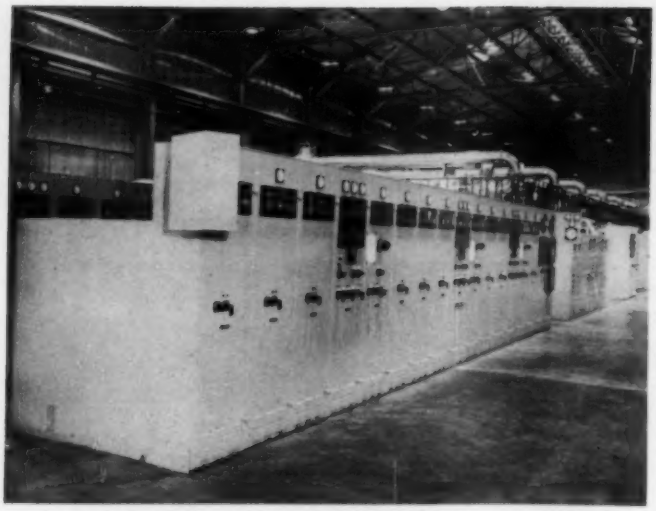
The General Motors main engines are controlled directly from the pilothouse, and both the main engines and the auxiliary engines are equipped with low lube oil pressure and high water temperature alarms. The steering systems are St. Louis Ship standard electro-hydraulic follow-up type. The two Contraguide steering rudders and the four backing rudders are controlled separately. On the forward deck is a Schoellhorn-Albrecht 10 hp. electric powered capstan and two 15 ton Beebe hand winches. Electric power is provided by two General Motors 60 kw. 125 volt direct current generating sets. Other auxiliary equipment includes Fairbanks-Morse water pressure sets, a Gardner-Denver 100 gpm. fire pump driven by a 5 hp. Century motor, a 50 gpm. Carter bilge and ballast pump, a Viking fuel oil service pump, two Quincy air compressors, two St. Louis Ship air tanks, and a Gould fuel oil transfer pump. The *Lady Linda* is modern in every respect and has already established an enviable performance record.



The two G-M auxiliary generating sets on the *Lady Linda*. Note the good lighting and easy accessibility.

The two G-M 1800 hp. main engines; both equipped with Marquette governors.





Part of the switchboard equipment in Building No. 40, which contains the alternating current generating power plant.

The San Patricio Aluminum Reduction Plant of the Reynolds Metals Company across the bay from Corpus Christi, Texas, adds 160,000,000 additional pounds per year to aluminum production

REYNOLDS

By REX W. WADMAN

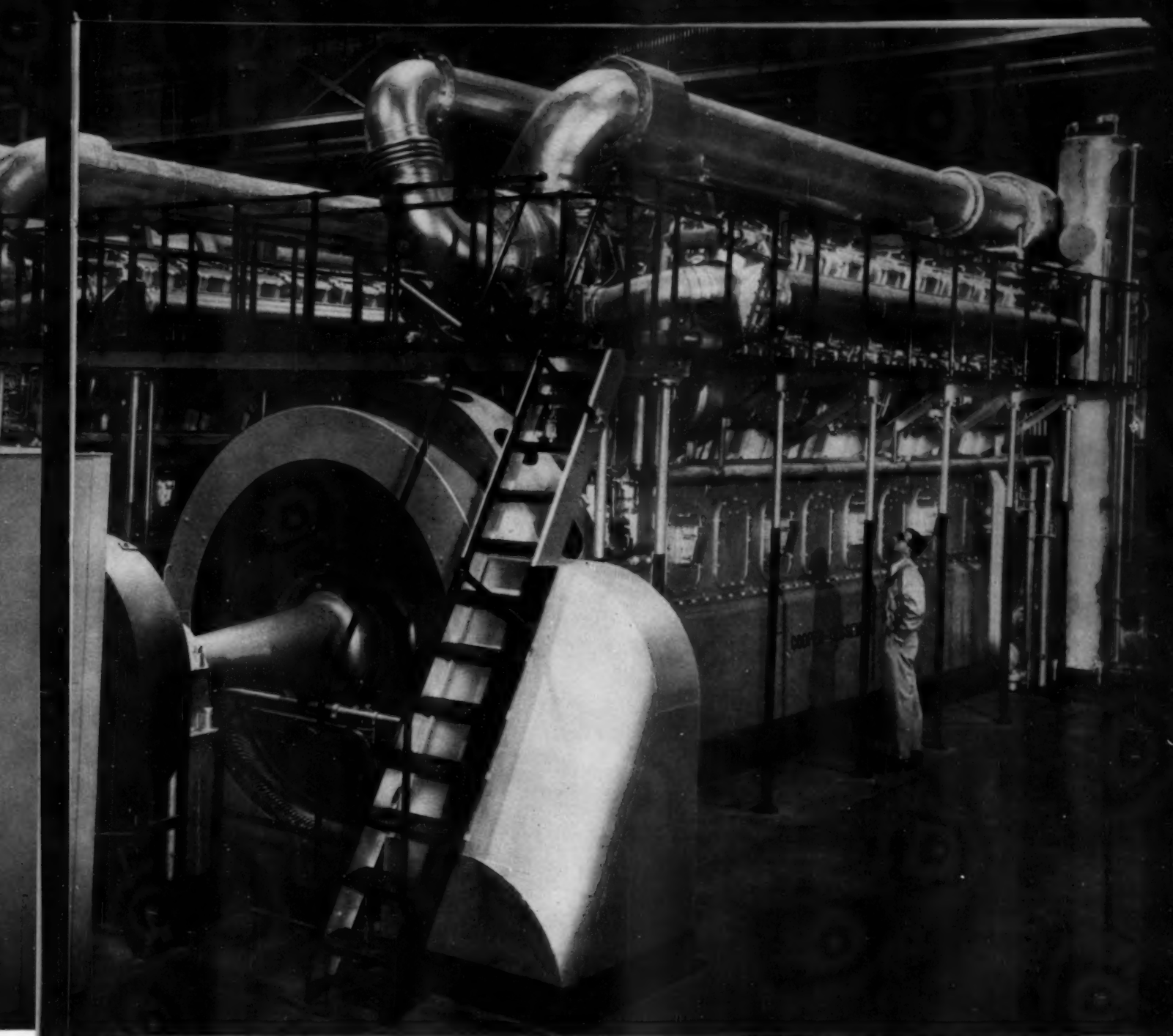
CORPUS CHRISTI, TEXAS, May 15.—The first metal was poured here today at the San Patricio Aluminum Reduction Plant of the Reynolds Metal Company, a day that will go down into history as adding a capacity of 160,000,000 pounds of aluminum to the productive ability of the aluminum reduction plants currently operating in these United States. Add this to the 400,000,000 pounds a year of eventual aluminum production at the Chalmette, Louisiana, plant of the Kaiser Aluminum and Chemical Corporation, which I described in the February, 1952, issue of DIESEL PROGRESS, and the 220,000,000 pounds of aluminum production currently being turned out at the Point Comfort, Texas, works of the Aluminum Company of America, which I described in the June issue of DIESEL PROGRESS, and you have a grand total of 780,000,000 pounds of aluminum production facilities available here on the Gulf Coast depending on the tremendous natural gas production in this general area. It may well be that when these three huge aluminum smelters are in full operation and obtaining their bauxite from Jamaica, that the cost of producing aluminum here on the Gulf Coast will be lower than anywhere else in the world.

At present this San Patricio plant is obtaining its alumina from Reynolds combined bauxite mines and alumina plant at Hurricane Creek, Arkansas. But eventually bauxite for this smelter will come from Jamaica, British West Indies, to a bauxite treating plant, which will produce alumina, currently being constructed adjoining the San Patricio Aluminum Reduction Plant.

In the four days I have spent here a number of interesting features of this huge installation stand out in my mind. For instance, this plant contains the two largest individual aluminum reduction pot lines in the country. The direct current generating buildings are the two largest internal combustion engine-generator buildings known in the world. This Reynolds Metals plant contains, I think, the first application of turbocharged 4-cycle gas engines to aluminum reduction pot lines, and I think this plant is the first aluminum reduction pot line to have integrated alternating current and direct current generating plants completely independent of outside power.

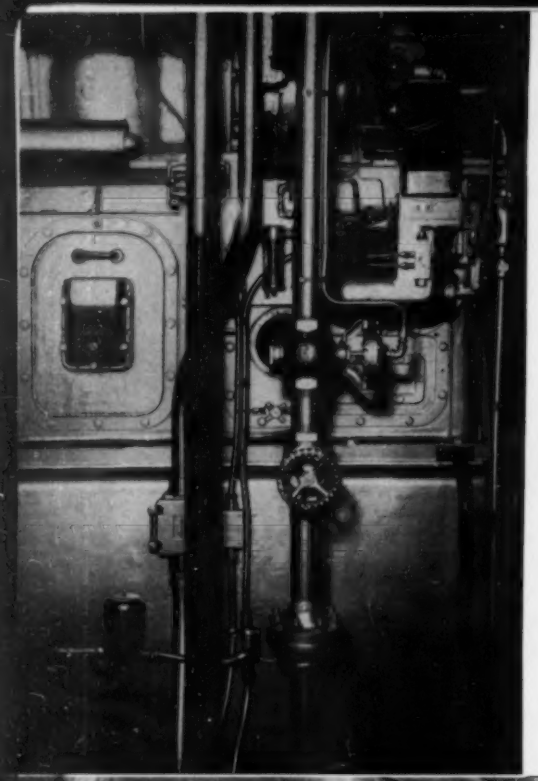
The power units installed, and to be installed, here at San Patricio consist of 42 Cooper-Bessemer 16-cylinder, 4-cycle, turbocharged natural gas engines rated 3700 hp. at 327 rpm., with a bore of 15½ in. and a stroke of 22 in. Nine of them are used for the production of alternating current, and are located in Building 40; thirty-three of these Cooper-Bessemer units are installed in Building 41, generating direct current for the adjoining aluminum pot lines. And then in Building 42 are currently being installed 41 General Motors 16-cylinder, 2-cycle, vertical natural gas engines, 14½x15½, rated 2850 hp. at 600 rpm. This article will deal with the general description of the whole power plant, especially as it pertains to the electrical control, and use and application of accessories. Because the installation of the 33 Cooper-Bessemers in Building 41 is not yet complete, and the installation of the 41 General Motors units is still in process in Building 42, I am only going to talk to you and illustrate Building 40, which is the alternating current generating heart of this fine installation. In a later issue I will tell you in full detail about the 16-cylinder vertical General Motors units, and will at the same time show you illustrations of the Cooper-Bessemer dc. building.

So, if I may, I will start talking about the plant as a whole, with emphasis on the alternating current building No. 40.



Corner shot of two of the nine Cooper-Bessemer 16-cylinder, 3700 hp. natural gas engines installed in the alternating current building here at Corpus Christi.

In addition to the requirements of generating plants for aluminum reduction pot lines, it is to be expected that the great size and new features of a plant such as this will involve special design considerations. Among these special requirements are: *Dependability*. It is essential in the generation of power for aluminum pot line use that the utmost dependability be provided. Only a short time is allowable without provision of power, once the pot line is energized. If an overlong power outage occurs, metal solidifies in the pots, which then must be re-lined. The repairs to the pots are extremely expensive and time consuming. With this thought in mind, each unit in the ac. and dc. generating plants has been made self-supporting just as far as is practicable. Dependence upon common plant facilities has been kept to a bare minimum, and standby mechanical and electrical equipment is installed. As a result, only failure of gas supply can cause complete plant shutdown. To insure against this there are two pipe lines running into the plant, either of which can operate the entire plant. *Low Labor Cost*. Care has been exercised in design, selection and layout of equipment, and provision of automatic devices insofar as practicable, to avoid the requirement of a large amount of operating labor, which might otherwise be required with such a large number of units. Full safeguards have been provided to prevent starting the units unless conditions are proper, and which will shut down the units in the event of improper or unsafe operating conditions. *Low Installation Cost*. The design of the foundations and the buildings has been co-ordinated with the type of engines selected, and in this Building 40 the layout has permitted shipping and placing on the foundations the Cooper-Bessemer engines with a minimum amount even of piping disassembly for shipment, such that the engines are handled in single pieces of 100 tons each. The engine design has permitted the use of a single floor building and a minimum, low cost foundation installation. *Climate*. The high atmospheric humidity encountered at the plant

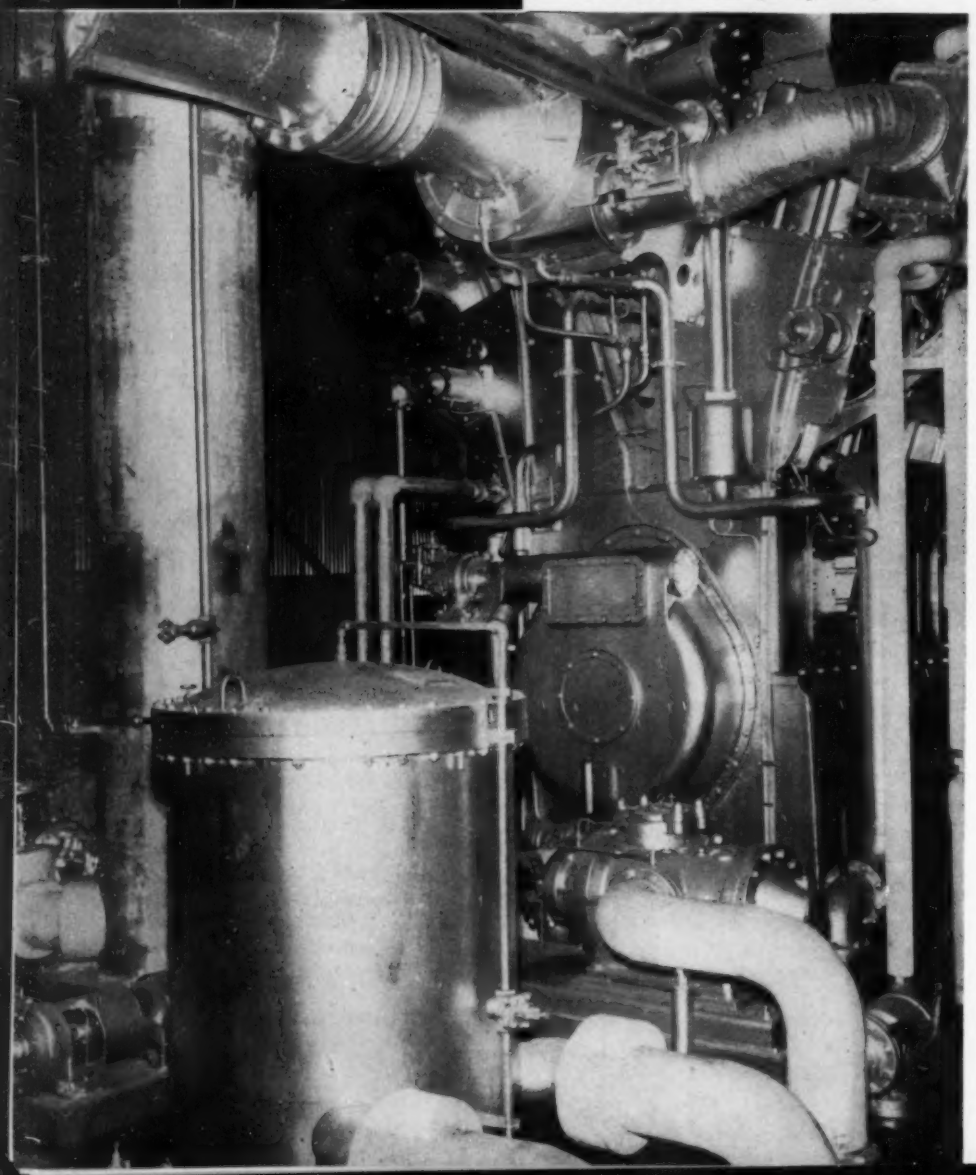


site has made necessary provisions of totally enclosed motors with Gulf Coast insulating dip and special vent provisions, space heating in generator switchgear, and control cubicles, and special painting of metal surfaces. The rather high ambient air temperatures encountered have required provisions for air cooling engine intake air, and for forced ventilation of the buildings. The possibility of low temperatures near freezing has required provisions of automatically controlled space heating elements in the lube oil and engine jacket water cooling radiators. *Wind*. The past occurrence of extremely high winds has resulted in a design of the buildings and all outdoor equipment to withstand a wind velocity of 125 mph.

To make this plant independent of outside power sources, and therefore less susceptible to power outages, an ac. generating plant has been provided. This ac. plant supplies power for auxiliaries in the two dc. pot line generating plants, and for the pot room, carbon plant and other general reduction plant needs.

Close-up of one of the Cooper-Bessemer units, showing Magnetrol lube oil level alarm bottom left, Woodward hydraulic governor top right.

End view of a Cooper-Bessemer unit with Cooper-Bessemer Commercial FullFlo lube oil filter in foreground, Young Radiator after-cooler right top, and one of the turbochargers top left.



One of the direct current generating buildings contains 33 Cooper-Bessemer dc. engine-generator units, totalling 122,100 bhp., for a generating capacity of 82,500 kw. The other dc. building will contain 41 General Motors dc. engine-generator units totalling 116,850 bhp., for a generating capacity of 82,000 kw. The ac. generating building contains nine main ac. engine-generator units totalling 33,300 bhp., for a generating capacity of 22,500 kw. The buildings are of the continuous ridged roof type with steel frames and corrugated aluminum siding and roofing, with patented sheet attachments. There are nine engines in the row in the ac. plant. The dc. building, No. 41, is of the double continuous ridged roof type with sixteen engines in one row and seventeen engines in the second row. The two rows of engine-generator uits in this dc. building are arranged with the generators towards the central crane columns of the building. The dc. building No. 42 is higher and narrower, and contains 41 General Motors vertical natural gas engines, as will be seen by the charts and cross-sections on the special flow chart section attached.

Permanent railroad tracks run inside each building, across the end, to permit handling equipment directly from railroad cars. The building cranes are all of 30 ton capacity, except in building No. 42 which has a 40 ton crane, which will handle the heaviest generator assemblies and all other parts except the main engine assembly. Two rows of temporary rails were provided across the engine foundations in Building No. 40 (this whole description applies specifically to Building No. 40 insofar as this and the next six paragraphs are concerned) to permit skidding of the individual Cooper-Bessemer engines directly from the railroad cars to a point over the proper foundation. Temporary rails were then removed and the engine set in its final position.

A continuous reinforced concrete foundation mat having a width equal to that of the engine-generator unit, a thickness of 30 in., and of sufficient length to support a group of engines, was first provided. There is one group of three main engine-generator units, and a second group of six units in the ac. generating building. There are three groups of eight engine-generator units and one group of nine units in the dc. generating building No. 41. The individual engine blocks set upon the mat are 3 ft. 6 in. in height and are tied to the mat by keys and reinforcing steel. The engine shaft center lines are therefore at a very low height above the supporting soil surface, and provide a very rigid and vibration free installation.

Trenches are provided around the engine block between the top of the mat and the floor level, and across both ends of the individual engine blocks, for trenches for piping, conduit, and items of non-operating equipment. Part of the space below floor level between engine foundation blocks is also used for the cross plant ventilating duct for each engine-generator unit.

View showing six of the Cooper-Bessemer 16-cylinder natural gas engines in the alternating current building; LeRoi emergency gasoline set left front; Mr. E. R. Bonnist, Advertising Director of the Cooper-Bessemer Corporation, right front.

Each unit is a completely independent operating entity, through the water, lube oil, air cooling, gas pressure control, and cooling systems, building ventilation, and running auxiliary power system, on the ac. generating units.

The common plant facilities which supply each unit are the starting air, gas supply, water supply, lube and air filter oil supply and return systems, starting auxiliary power for ac. unit auxiliaries, and running auxiliary power on the dc. generating units.

The engines in the ac. building No. 40 are Cooper-Bessemer model LSV-16-SG vertical Vee type, 16-cylinder, four cycle, spark ignited, supercharged gas engines. The engines are arranged for starting by 250 psi. compressed air. A flat bottom base is provided on these engines, which contains the lubricating oil sump, and permitted the simple unloading, skidding, and setting of these engines with an assembled and shipped weight of 100 tons. Each engine is directly coupled to a 2500 kw., 327 rpm. engine type generator. The exciters for the alternating current generators are Vee belt driven from the engine-generator extension shafts.

At this point, because I want to give you the benefit of his intimate knowledge, I have asked Mr. Frank L. Kaestle, project engineer for General Electric Company, to tell me in his own words just what electrical equipment and electrical controls have been installed in this huge power plant. I am passing on to you, as nearly as I can, what Mr. Kaestle told me here at Corpus Christi yesterday afternoon.

(Cooper Bessemer dc. plant—Building No. 41.)— Each of the engines drives a horizontal generator rated 2500 kw. at 725 volts dc., at 40 deg. C. rise, Class B insulated. By that means the generators can be designed to cover a voltage range of from 650 to 800 volts dc. without exceeding permissable temperature rises for Class B insulation on any part throughout this range. The generators are then capable of carrying 3850 amperes maximum at the low voltage of 650, and the maximum of 3125 amperes at the top voltage of 800 volts. All generators have 250 volt shunt fields. Normally all generators operate in parallel. Likewise their shunt fields are operated in parallel from a common excitation bus. There are two duplicate and alternate field busses, each supplied by a 400 kw. exciter motor generator set. Either exciter may be switched to either bus, and the shunt fields of each machine may be switched to either bus. Each generator has a motor operated shunt field rheostat which serves two purposes: one, to adjust the voltage of any generator to that of the bus when paralleling units, and two, to control the current division between generators when operating in parallel. Each generator is provided with both positive and negative line circuit breakers. The negative line circuit breaker has over-current trips to protect against bus faults and severe generator overcurrents. The positive line circuit breaker has reverse current trips to protect against faults in the generator or the leads to it.

All engine auxiliaries are 60-cycle induction motor driven, and are supplied ac. power from ac. building No. 40. Motors for auxiliary equipment are supplied by two unit substations on which there is a feeder breaker for each engine. These two unit substations include four 750 kva. transformers, each of which is served by a separate 4160 volt feeder from the ac. building. In addition to the substation serving the engine auxiliaries there is a general service substation supplying building services, lighting, etc. Also the pump room servicing the lube oil circulation and viscosene circulation and clarification, also the battery charger, motors for the two air compressors and building ventilating fans (which bring air into the building).

Each of the main exciter sets is driven by a 580 hp., 4,000 volt synchronous motor which likewise receives its power by separate feeders from the ac. plant. Each exciter set is provided with its own separate amplidyne motor generator set. The

amplidyne set simply serves as a high gain exciter set. It is by control of the amplidyne field that the main pot line voltage is controlled. The amplidyne field may be controlled manually by a manually operated potentiometer, or automatically by control potentiometers included in the recording ammeters and voltmeters. The main exciter sets and their amplidyne sets are located in the center control bay of Building 41 and the recording ammeters and voltmeters are located on the remote master control panel in Building 43. The master operator may choose automatic current or automatic voltage, or manual control at will, and transfer from any one to the other without interruption of load.

Each engine-generator set is provided with an engine-generator control cubicle located on the operating aisle near each generator. This cubicle consists essentially of two sections, one for the engine and one for the generator. The engine section includes the thermometers, gauges and pyrometer, as well as the ignition ammeter and voltmeter and starting devices for the auxiliaries and the engine itself. The generator sections include control of the positive and negative line circuit breakers, the generator ammeter and voltmeter, the engine tachometer, the hour meter, and all of the relays and indicating lights associated with the alarm and automatic shutdown features for the engine. The latter system consists of a series of amber lights which are anticipatory alarm signals, and a group of red lights that are engine shut down identification lights. They identify the particular function that is causing trouble. The operating features covered by these alarm signals are: Anticipatory alarm signals for (1) low aftercooler water pressure, (2) high lube oil filter differential pressure, (3) low exhaust temperature, (4) high manifold air temperature, (5) low ignition voltage, (6) low jacket water level, (7) low engine lube sump level, (8) high exhaust temperature, (9) high manifold air temperature (left bank), (10) high manifold air temperature (right bank), (11) low gas pressure, (12) high jacket water temperature, (13) low lube oil turbo pressure (1), (14) low lube oil turbo pressure (2), (15) low lube oil engine pressure. Red shut down identification lights are provided for (1) high jacket water temperature, (2) low lube oil turbo pressure (1), (3) low lube oil turbo pressure (2), (4) low lube oil engine pressure, (5) overspeed, (6) high outboard bearing temperature, (7) low jacket water pressure, (8) high lube oil engine temperature, (9) low control air pressure, and (10) main generator breaker. It will be noted that four functions have both amber and red lights, the degree of malfunction determining whether an anticipatory alarm or a shut down results. This cubicle also mounts the generator field contactors and Thyrite discharge resistors.

The auxiliary motors for each engine are controlled by an auxiliary motor control cubicle located with the principal engine auxiliaries in the engine auxiliary bay. This control consists of separate magnetic motor starters for each motor as well as the ignition battery and automatic charging equipment for it. It also includes an auxiliary power transformer and panel board for distribution of all auxiliary power associated with this engine.

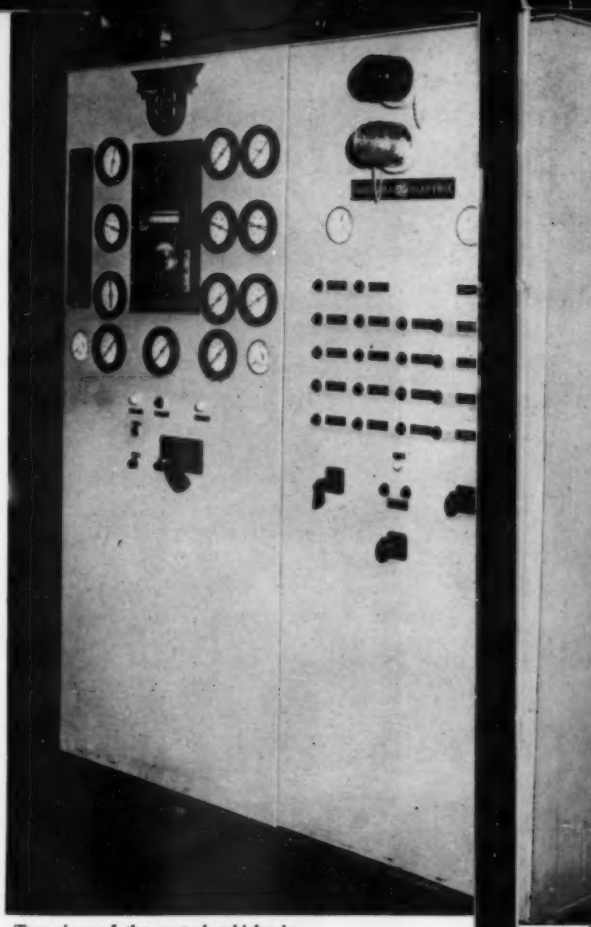
The ignition supply system consists of a selenium oxide rectifier which normally supplies the ignition system in parallel with an ignition supply battery. In case of failure of the selenium rectifier supply the battery furnishes ignition supply without interruption. An automatic charge controller is included to keep the ignition battery charged continuously, both while the engine is in normal operation and when standing by or when shut down. The ignition battery is a 12-volt dc., Exide 6-cell unit.

All current measurements, for the generators, for the dc. bus tie to Building 42, and the main line to the pot room are made by means of current measuring reactors. Those of the generator circuits are rated 5,000 amperes, the tie circuit 20,000 amperes, and the main pot line 120,000 amperes. By use of these reactors currents may be measured accurately at several remote points, while keeping the metering circuits isolated from the high voltage dc. busses.

In the central control bay of Building 41 are located the unit sub-stations, the exciter motor generator sets, and the amplidyne motor generator sets which have been described, as well as the station storage battery, a Phanatron battery charger, a switchgear and control cubicle for the exciter sets, a cabinetrol motor control group unit for the building services such as the air compressors, lube oil pumps, viscosene system, etc. There is also in the central control bay a master alarm panel with indicating lights to show alarm and emergency shut down of any of the engine generator units in this building. This master alarm panel also includes alarms for common facilities such as low gas pressure, low air pressure, etc.

The equipment of the engine-generator control cubicle makes it possible to control the engine on both starting, stopping and running from this position, optionally to control the generator loading from this point, and to trip the generator breakers in case of emergency. Only the dc. generator breakers can be closed at the engine-generator control cubicles for those units.

One pushbutton on the engine-generator control cubicle starts all individual unit auxiliaries. When auxiliary systems are operating at the proper pressures and temperatures, all alarm and shutdown lights will go out as their contactors close. When all of these safeguard contacts close, a circuit is made up which can be locked in by again depressing the auxiliary start button. When this condition applies, the control handle can be turned into the start position and the air push button depressed to roll the engine on starting air. Five seconds after the starting air button is depressed, the ignition is turned on automatically, which releases the detent on the control lever so that it may be turned into position to admit gas to the engine. As the engine fires, starting air can be released, and the gas control lever can be slowly moved into the full run position. This will place the unit at full operating

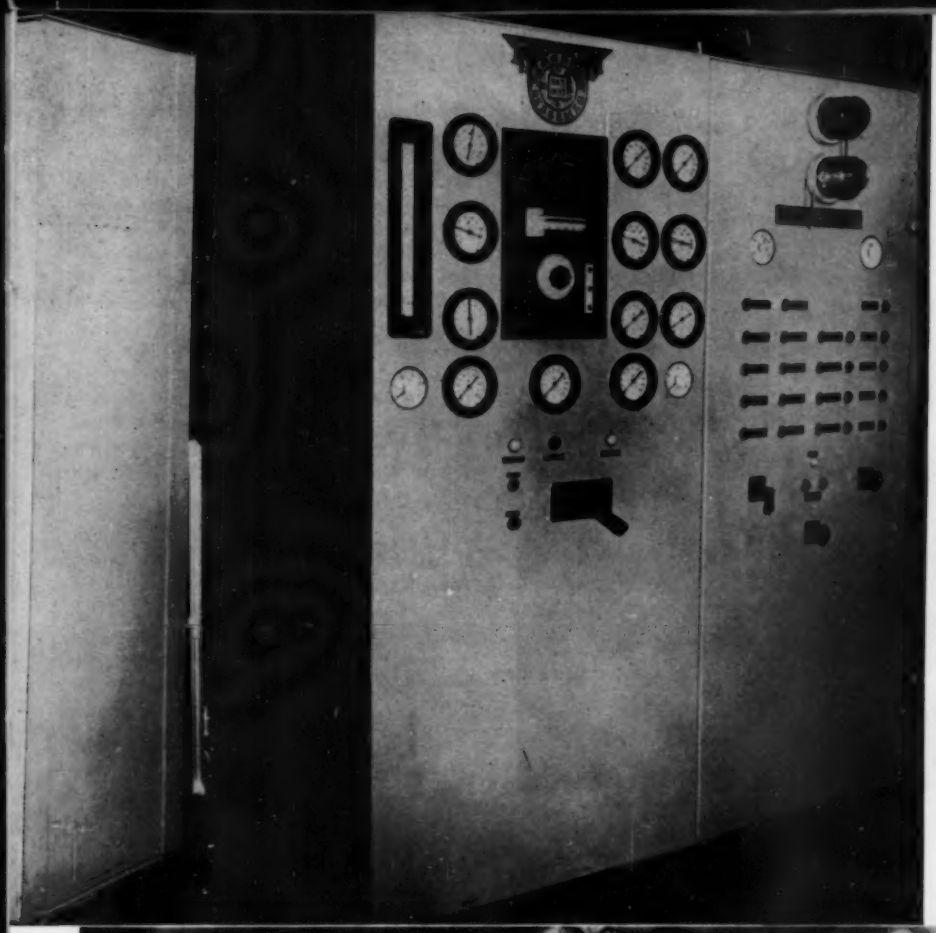


Two views of the control cubicles in the alternating current building: the Bristol Scanning Pyrometer center left, and Meriam Manometer outside left.

speed under control of the governor, and ready for loading. Placing the generator on the line is accomplished at the main switchgear on the ac. units, and is accomplished at the engine-generator control cubicle on the dc. units.

The foreman or assistant foreman will normally start the engine, run it as required, parallel the generator on the bus, and obtain partial load, and then transfer control to the remote master operator's panel in Building No. 43. The remote master operator's panel contains a group of duplicate devices for each separate engine as well as the common control of the excitation system and the pot line metering equipment. For each engine there is a generator ammeter, a control switch for the generator rheostat, an emergency trip button for the generator circuit breakers, and two indicating lights. One light indicates that that unit is ready for load, and that control has been transferred to the master operator. The other light indicates an automatic shut down of that unit, when such occurs.

The common control on the master panel includes indicating ammeter and voltmeter for the pot line, recording voltmeters, ammeters, and wattmeters for the pot line control switch, and ammeter for the dc. bus tie circuit and all control and indication of the amplidyne regulating system. This amplidyne regulating system includes the



manually controlled potentiometer as well as current preset and voltage preset rheostats whereby any predetermined value of current or voltage for automatic control may be selected. It also includes transfer switches which permit the master operator to select the type of control desired, and indicating lights which show that transfer has taken place when proper rheostat adjustments have been made. There is also provided a master crash button which on emergency will bring the main pot line current quickly to near zero and then trip and lock out all generator breakers. This is accomplished by a suicide control of the amplidyne generator. There are several emergency crash stations located in the pot room itself, which perform this same suicide function.

The recording ammeter and voltmeter include the control potentiometers which provide the automatic signal for pot line control. Also the L&N instruments have integrating devices so that a record of ampere hours, volt hours and kilowatt hours are kept continuously regardless of the method of control at any time.

This master control panel is a virtual duplicate of that for control of the General Motors equipment in Building 42, and is located alongside it to form a continuous U-shaped master panel. The

General view of six of the Cooper-Bessemer units in the alternating current building showing the General Electric generators and control cubicles. Engine room filtered air coming in at middle right.

Air view of plant taken several weeks ago. Alternating current generating building is in right foreground.

master control room also includes a master alarm panel to indicate the number of units running and the breakers closed in the ac. engine generator plant, Building 40. This master control room is located approximately mid-way between buildings 41 and 42, and includes in addition to the master panel the offices for the power plant superintendent and his staff.

(General Motors dc. Plant—Building No. 42.)—Each of the General Motors engines drives a vertical dc. generator rated 2,000 kw. at 725 volts, 40 deg. C. rise, Class B insulated. This generator has the same voltage range of 650 to 800 volts dc. as those for the Cooper-Bessemer units. The entire electrical system for this plant is a virtual duplicate in function of that of the Cooper-Bessemer equipment. The only essential differences are that the General Motors units are electrically started rather than air started, and that the arrangement of sub-stations serving the auxiliaries is somewhat different in details and ratings—principally in the requirements of the scavenging blower motors for each engine in this building. The unit sub-stations serving the auxiliaries consist of eight 1500 kva. units, each having five feeder breakers serving a group of individual engines.

Electric starting of each engine is accomplished by using its generator as a motor for cranking. In addition to the two field busses, there is installed a starting bus to which each generator is connected by means of a starting contactor for the starting operation. The starting bus is in turn supplied from one of the main exciters to provide variable voltage power supply for starting the engines consecutively from a complete plant shut down. Either exciter may be used as a starting source while the other is used as a main field source for normal operation. In addition there is furnished a small generator field supply set to provide full generator field for starting in case one of the main exciters should be put out of service when starting operations are required.

The main exciters, the amplidyne exciters, the general service unit sub-station, the storage battery, the battery charging equipment, all are duplicates of that for Building 41, and are located in the central control bay of Building 42. Likewise, there is an engine generator control cubicle and an auxiliary motor control cubicle which performs the same functions as described before, and a remote master operator's panel in Building 43 which is essentially a duplicate of the other unit. Other than for the method of starting, the functional control and metering of both dc. power plants are the same. These two power plants are rated as nearly the same as practically possible. The Cooper-Bessemer Building 41 will have 33 engines rated at 2500 kw each, for a total of 82,500 kw. Building 42 will contain 41 General Motors units rated at 2000 kw each, for a total of 82,000 kw. Each plant has approximately 120,000 installed hp., for a total of approximately 240,000 hp.

(Cooper-Bessemer ac. plant—Building No. 40.)—Each of the nine Cooper-Bessemer engines drives an ac. generator rated 2500 kw., 3125 kva., .8 power factor, 4160 volts, 3-phase, 60-cycle, 50 deg. C. rise, Class A insulated. Each has its own belt driven exciter. The generators are divided into three groups of three generators each, serving a 4160 volt bus section of the main station metal clad switch-gear equipment. The three main bus sections are in turn synchronized through synchronizing reactors to a common synchronizing bus. The three bus sections have 4160 volt feeder breakers serving not only the unit sub-stations in the two dc. engine plants, but also unit sub-stations for a total of approximately 6,000 kva. of plant power distributed throughout the plant. Under normal operating conditions each ac. generator serves its own engine auxiliaries through a 112.5 kva. auxiliary power transformer. For initial starting operation the auxiliaries for each engine are also served from a starting bus which in turn is served by a gasoline engine driven generator rated 300 kw., at 1480 volts. The 480 volt starting bus is normally served by a unit sub-station which in turn receives its power from one of the main units. Therefore the unit sub-station serves starting power at any time after one main unit has been started, and the LeRoi engine set is needed only for the start of the first unit, or for emergency lighting service in case of a complete plant shut down.

All generators are operated neutral grounded through a grounding resistor for each bus section. Neutral disconnecting switches are provided for isolation of all generator neutrals. A 4160 volt tie circuit is provided for incoming power from the alumina plant which is currently being constructed adjacent to this aluminum reduction plant.

The engine generator control cubicles and the auxiliary control cubicles for each engine are virtually duplicates of those for the Cooper-Bessemer dc. units, except for the details associated with ac. generators. These consist primarily of the fact that a frequency meter instead of a tachometer is used, and the fact that the dc. generator control unit is omitted entirely. In the case of ac. units, which must be synchronized on the bus, all control is transferred to the main metal clad switchgear unit for synchronizing and putting in service.

In the center control bay of this building there are located the gasoline engine set and the switch gear and control equipment for it, as well as the general services unit sub-station, the station storage battery, and the charger for it, and the cabinetrol motor control units for the building general services. Likewise, there is also included a master alarm panel for the ac. units of this building which is a duplicate of that in the remote master control room as already described in Building 43.

The Exide 60-cell station control battery for control of the switchgear equipment and its charging equipment are duplicates of those in Buildings 41 and 42. (In other words, the Exide installation includes one 60-cell station battery for each of the three buildings, and eighty-three 120-volt, 6-cell ignition batteries, one for each engine.)

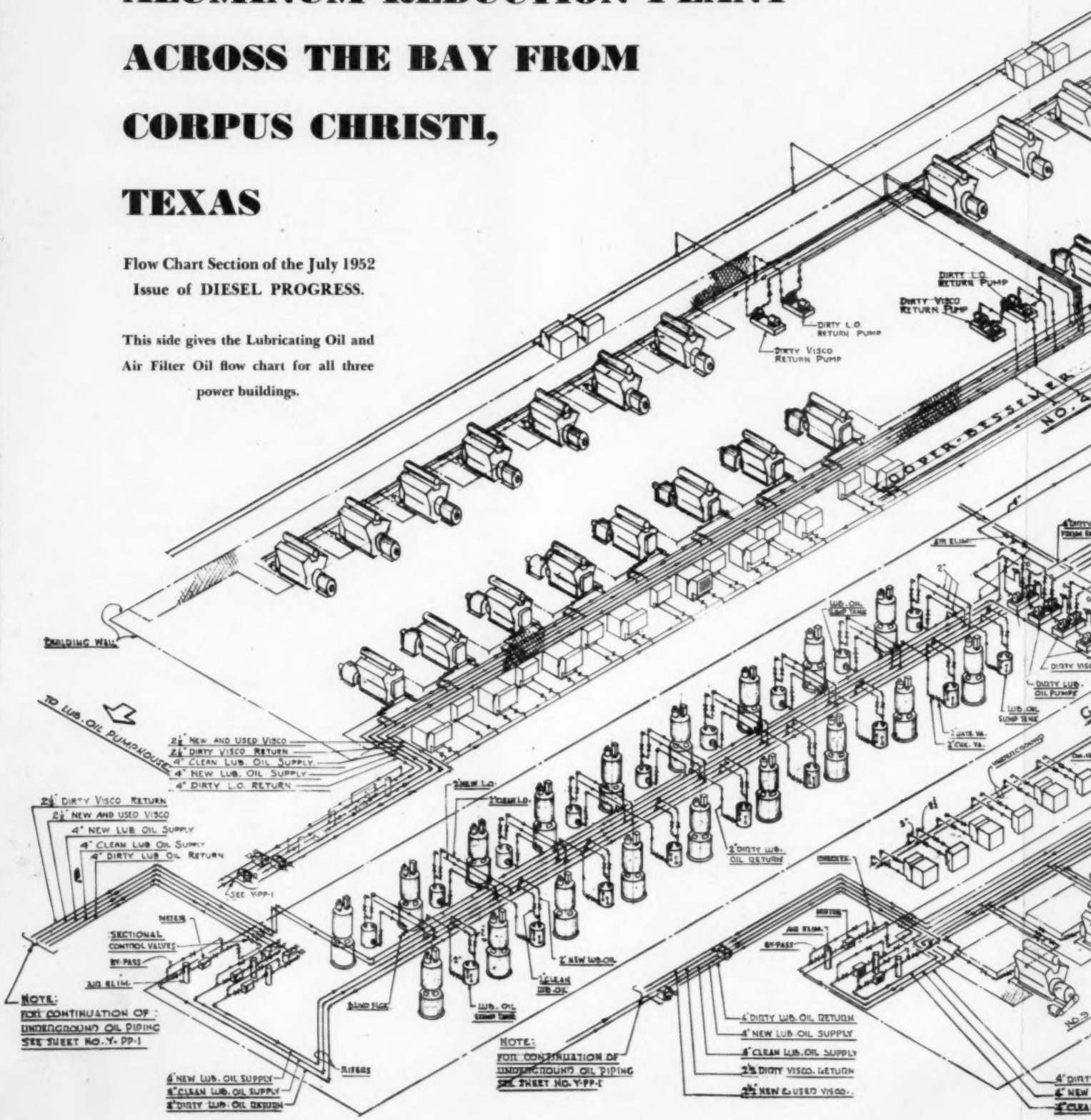
Now that gives you, just as clearly as I can, the description of the electrical controls and the electrical equipment in this plant. I thought it better to bring it to you in the words of a man who has lived with this part of the job since its inception, than to try to actually dig it out myself.

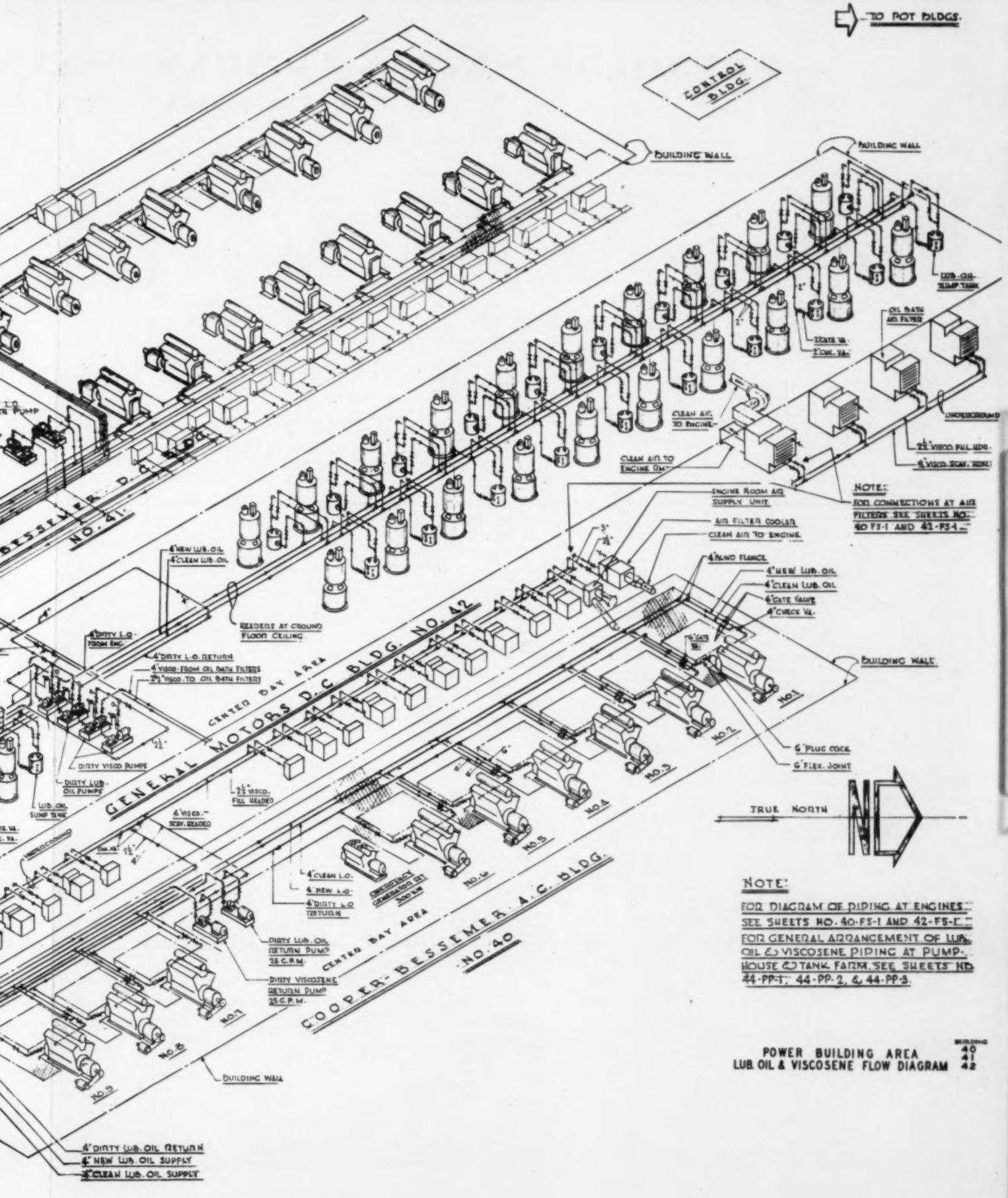
Now, continuing the general description of the plant, for each row of sixteen or seventeen engine-generator units in the dc. plant, and for the nine engines in the ac. plant, there is supplied a set of air starting equipment, each comprising

REYNOLDS METALS COMPANY ALUMINUM REDUCTION PLANT ACROSS THE BAY FROM CORPUS CHRISTI, TEXAS

Flow Chart Section of the July 1952 Issue of DIESEL PROGRESS.

This side gives the Lubricating Oil and Air Filter Oil flow chart for all three power buildings.




TO POT BLDGS.
CONTROL BLDG.
BUILDING WALL
BUILDING WALL
COOPER-BESSEMER D.C. BLDG. NO. 41
GENERAL MOTORS D.C. BLDG. NO. 42
COOPER-BESSEMER A.C. BLDG. NO. 40
CENTER BAY AREA
CENTER BAY AREA
4" NEW LUB. OIL
4" CLEAN LUB. OIL
READERS AT GROUND FLOOR CEILING
4" DIRTY L.O. FROM ENG.
4" DIRTY L.O. RETURN
4" VISCO. FROM OIL BATH FILTERS
2½" VISCO. TO OIL BATH FILTERS
DIRTY VISCO PUMPS
DIRTY LUB. OIL PUMPS
LUB. OIL SUMP TANK
2½" VISCO. FILL HEADER
4" VISCO. RET. HEADER
4" CLEAN L.O.
4" NEW L.O.
4" DIRTY L.O. RETURN
DIRTY LUB. OIL RETURN PUMP 25 G.P.M.
DIRTY VISCOSENE RETURN PUMP 25 G.P.M.
BUILDING WALL
4" DIRTY LUB. OIL RETURN
4" NEW LUB. OIL SUPPLY
4" CLEAN LUB. OIL SUPPLY
CLEAN AIR TO ENGINE
CLEAN AIR TO ENGINE DIM
ENGINE ROOM AIR SUPPLY UNIT
AIR FILTER COOLER
CLEAN AIR TO ENGINE
4" BLIND FLANGE
4" NEW LUB. OIL
4" CLEAN LUB. OIL
4" GATE VALVE
4" CHECK VA.
BUILDING WALL
6" PLUG COCK
6" FLEX. JOINT
NO. 1
NO. 2
NO. 3
NO. 4
NO. 5
NO. 6
NO. 7
NO. 8
NO. 9
TRUE NORTH
NOTE:
FOR CONNECTIONS AT AIR FILTERS SEE SHEETS NO. 40 FS-1 AND 42-FS-1.
NOTE:
FOR DIAGRAM OF PIPING AT ENGINES SEE SHEETS NO. 40-FS-1 AND 42-FS-1.
FOR GENERAL ARRANGEMENT OF LUB. OIL & VISCOSENE PIPING AT PUMP-HOUSE & TANK FARM, SEE SHEETS NO. 44-PP-1, 44-PP-2, & 44-PP-3.

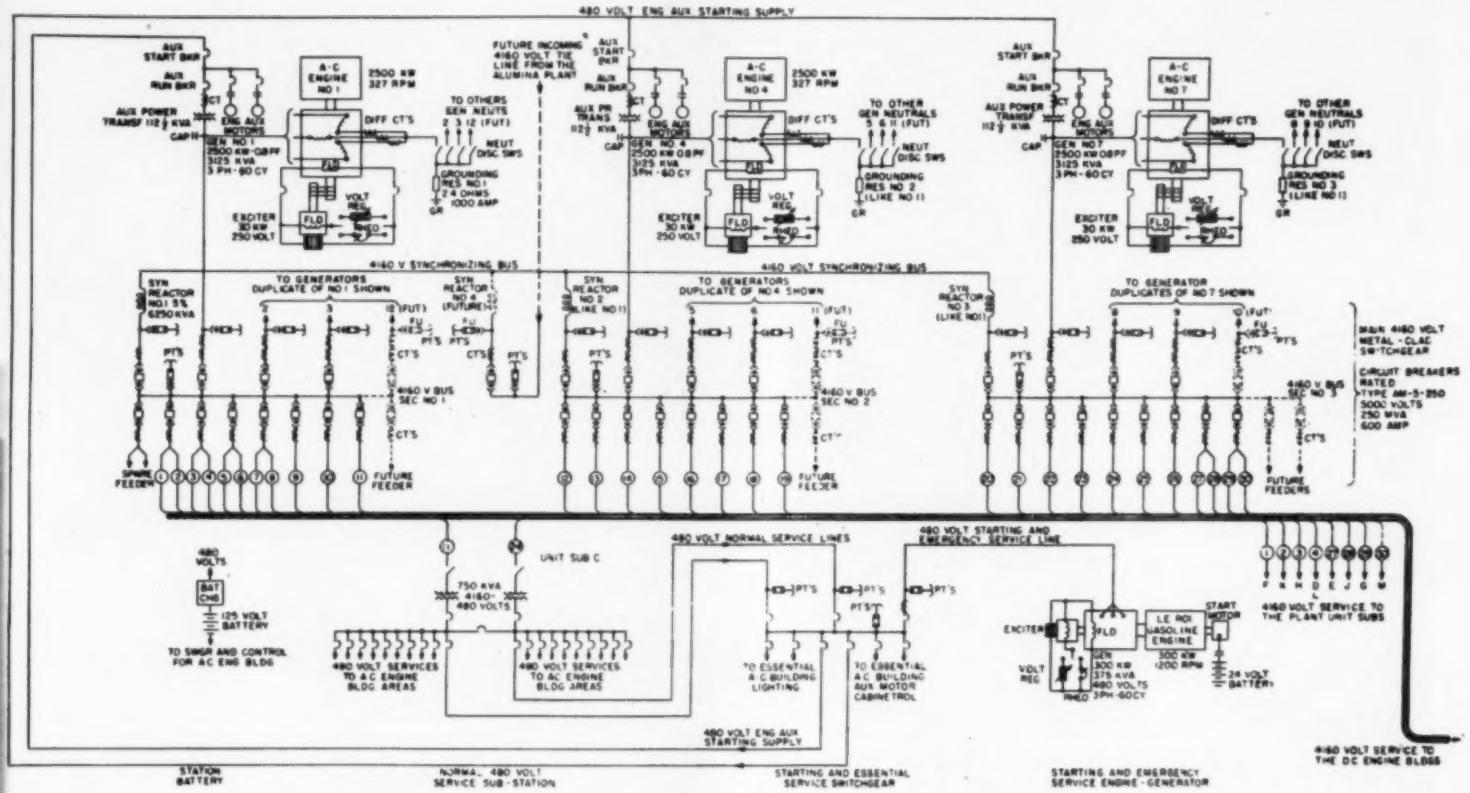
POWER BUILDING AREA
LUB. OIL & VISCOSENE FLOW DIAGRAM

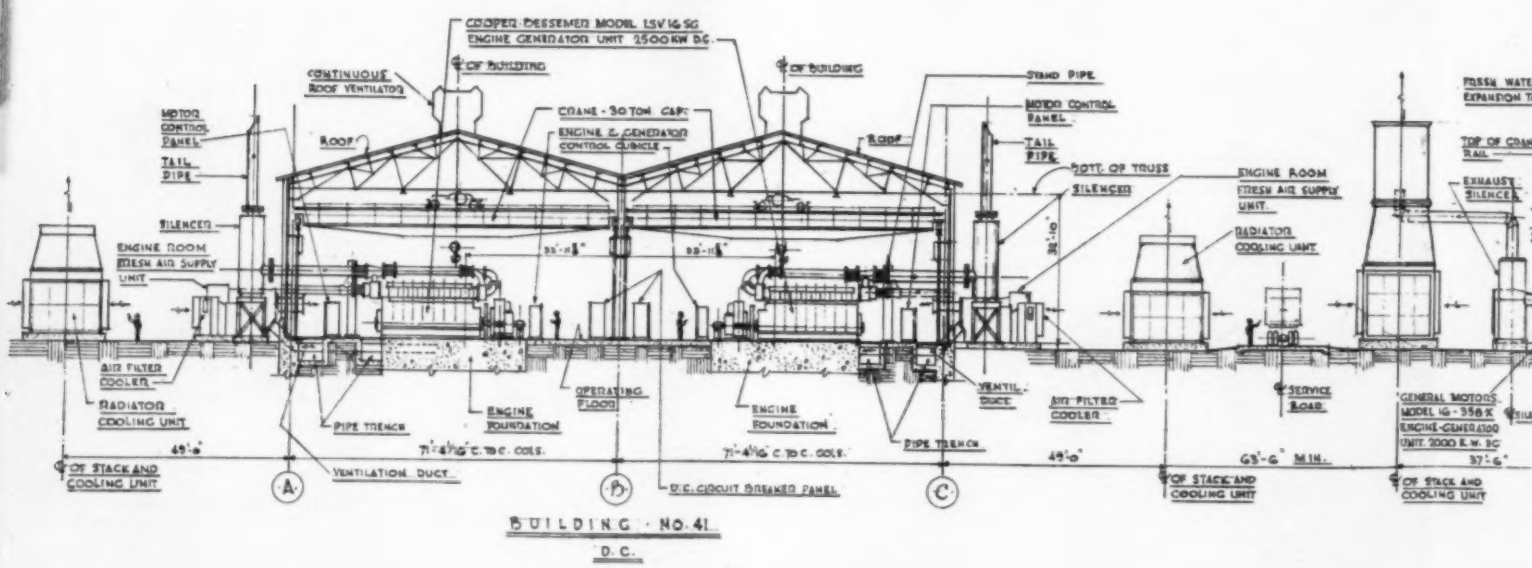
BUILDING
40
41
42

REYNOLDS METALS COMPANY—SAN

J. GORDON TURNBULL, IN

Electrical Flow Chart—Alternating Current Building #40


480 VOLT ENG AUX STARTING SUPPLY
A-C ENGINE NO 1
2500 KW 327 RPM
A-C ENGINE NO 4
2500 KW 327 RPM
A-C ENGINE NO 7
FUTURE INCOMING 4160 VOLT TIE LINE FROM THE ALUMINA PLANT
4160 V SYNCHRONIZING BUS
4160 VOLT SYNCHRONIZING BUS
TO GENERATORS DUPLICATE OF NO 1 SHOWN
TO GENERATORS DUPLICATE OF NO 4 SHOWN
TO GENERATOR DUPLICATES OF NO 7 SHOWN
MAIN 4160 VOLT METAL-CLAD SWITCHGEAR
CIRCUIT BREAKERS RATED TYPE AM-5-250 5000 VOLTS 250 MVA 600 AMP
4160 V BUS SEC NO 1
4160 V BUS SEC NO 2
4160 V BUS SEC NO 3
SPARE FEEDER
FUTURE FEEDER
FUTURE FEEDERS
480 VOLTS
125 VOLT BATTERY
TO SWGR AND CONTROL FOR AC ENG BLDG
UNIT SUB C
750 KVA 4160-480 VOLTS
480 VOLT NORMAL SERVICE LINES
480 VOLT STARTING AND EMERGENCY SERVICE LINE
480 VOLT SERVICES TO AC ENGINE BLDG AREAS
480 VOLT SERVICES TO AC ENGINE BLDG AREAS
TO ESSENTIAL A C BUILDING LIGHTING
TO ESSENTIAL A C BUILDING AUX MOTOR CABINETROL
480 VOLT ENG AUX STARTING SUPPLY
LE ROI GASOLINE ENGINE
300 KW 375 KVA 480 VOLTS 3PH-60CY
300 KW 1200 RPM
24 VOLT BATTERY
4160 VOLT SERVICE TO THE PLANT UNIT SUBS
4160 VOLT SERVICE TO THE DC ENGINE BLDGS
STATION BATTERY
NORMAL 480 VOLT SERVICE SUB-STATION
STARTING AND ESSENTIAL SERVICE SWITCHGEAR
STARTING AND EMERGENCY SERVICE ENGINE-GENERATOR

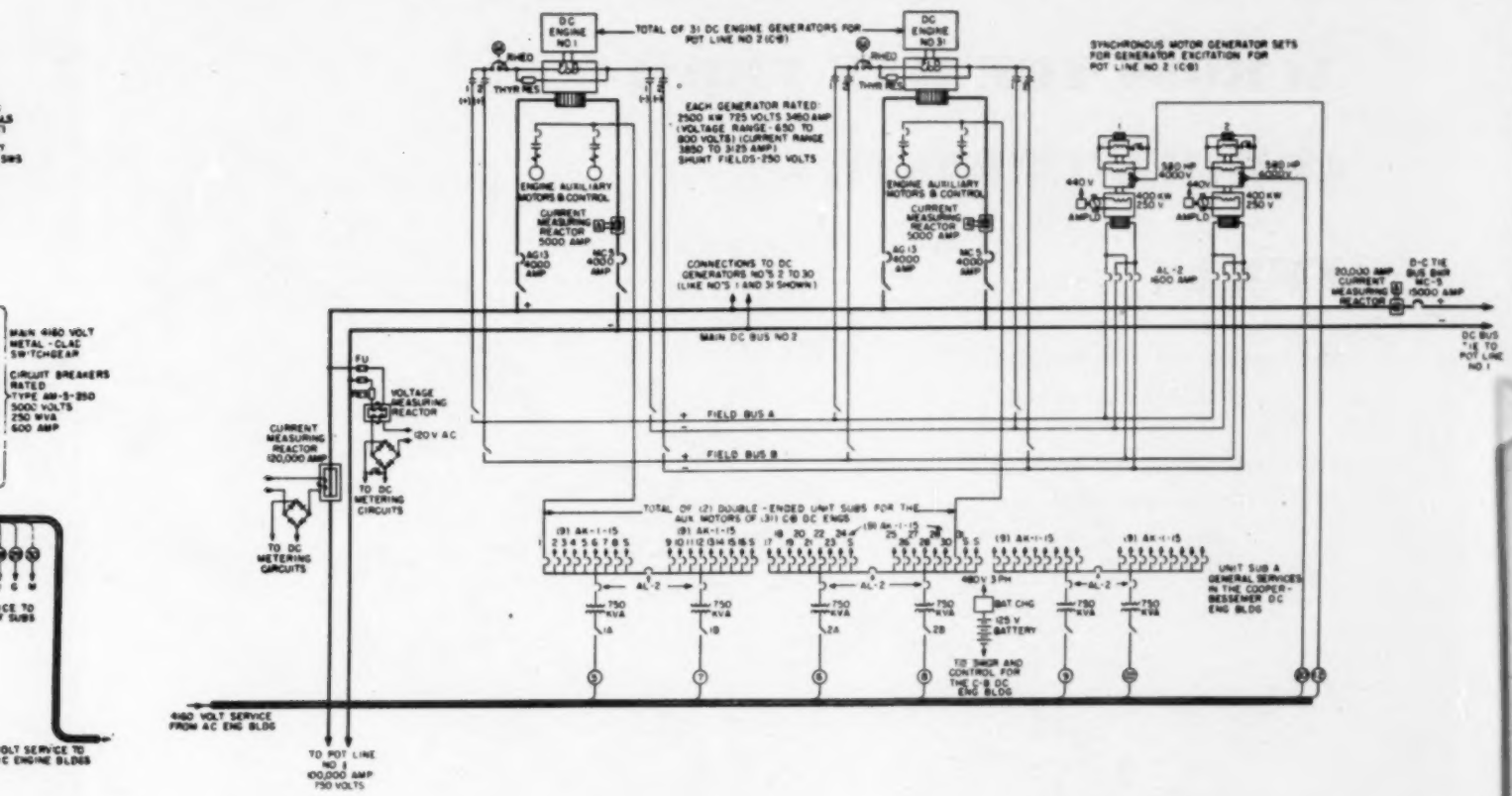


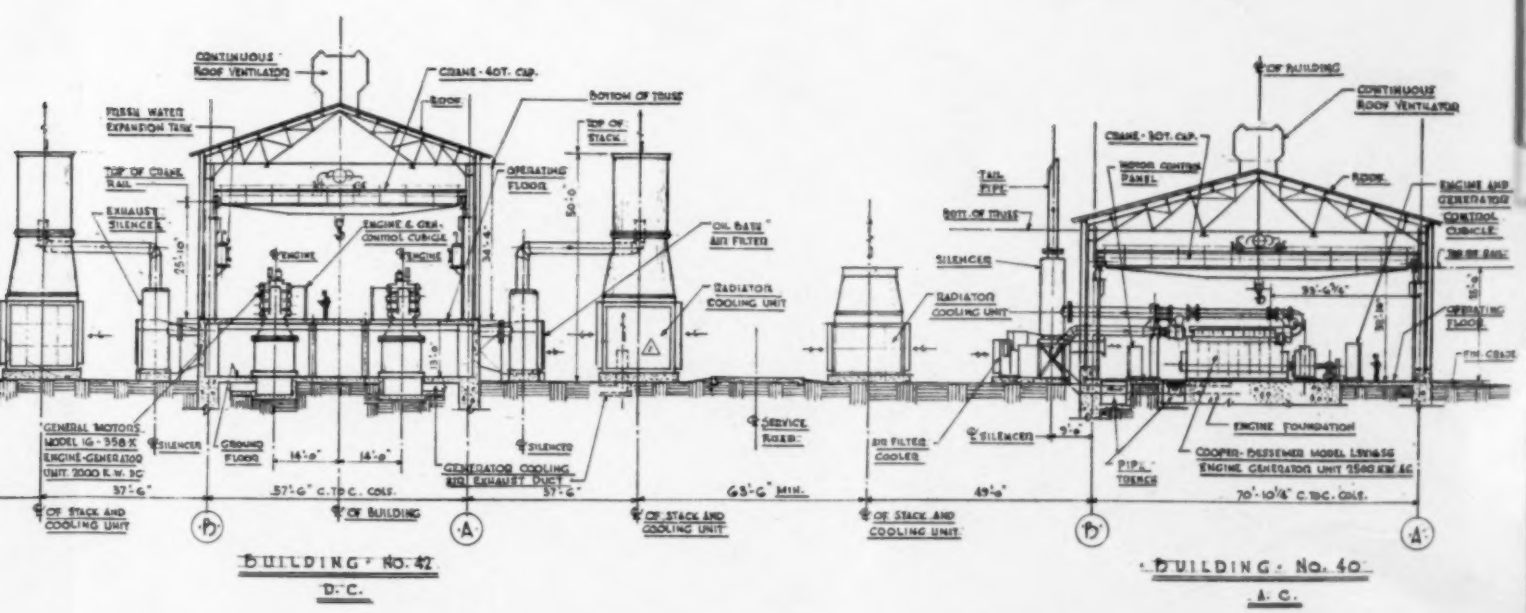
— TYPICAL · CROSS · SECTION — P

—SAN PATRICIO REDUCTION PLANT

RNBULL, INC. — ENGINEERS

Electrical Flow Chart—Building #41 Cooper-Bessemer D.C. Engine Room


DC ENGINE NO 1
TOTAL OF 31 DC ENGINE GENERATORS FOR POT LINE NO 2 (C-B)
DC ENGINE NO 31
RHEO
THYR RES
EACH GENERATOR RATED: 2500 KW 725 VOLTS 3450 AMP (VOLTAGE RANGE - 650 TO 800 VOLTS) (CURRENT RANGE 3850 TO 3125 AMP) SHUNT FIELDS-250 VOLTS
ENGINE AUXILIARY MOTORS & CONTROL
CURRENT MEASURING REACTOR 5000 AMP
AG 13 4000 AMP
MC 5 4000 AMP
CONNECTIONS TO DC GENERATORS NO'S 2 TO 30 (LINE NO'S 1 AND 31 SHOWN)
SYNCHRONOUS MOTOR GENERATOR SETS FOR GENERATOR EXCITATION FOR POT LINE NO 2 (C-B)
580 HP 4000 V
440 V
400 KW 250 V
AMPLD
AL-2 4000 AMP
20,000 AMP CURRENT MEASURING REACTOR
B-C TIE BUS BAR MC-5 15000 AMP
MAIN DC BUS NO 2
DC BUS TIE TO POT LINE NO 1
FU
VOLTAGE MEASURING REACTOR
120 V AC
CURRENT MEASURING REACTOR 20,000 AMP
TO DC METERING CIRCUITS
FIELD BUS A
FIELD BUS B
TOTAL OF (2) DOUBLE-ENDED UNIT SUBS FOR THE AUX MOTORS OF (31) C-B DC ENGS
(9) AK-1-15
(10) AK-1-15
AL-2
750 KVA
480 V 3 PH
BAT CHG
125 V BATTERY
TO SHOP AND CONTROL FOR THE C-B DC ENG BLDG
UNIT SUB A GENERAL SERVICES IN THE COOPER-BESSEMER DC ENG BLDG
4160 VOLT SERVICE FROM AC ENG BLDG
TO POT LINE NO 1 100,000 AMP 750 VOLTS
MAIN 4160 VOLT METAL-CLAD SWITCHGEAR
CIRCUIT BREAKERS RATED TYPE AM-3-250 3600 VOLTS 250 MVA 600 AMP



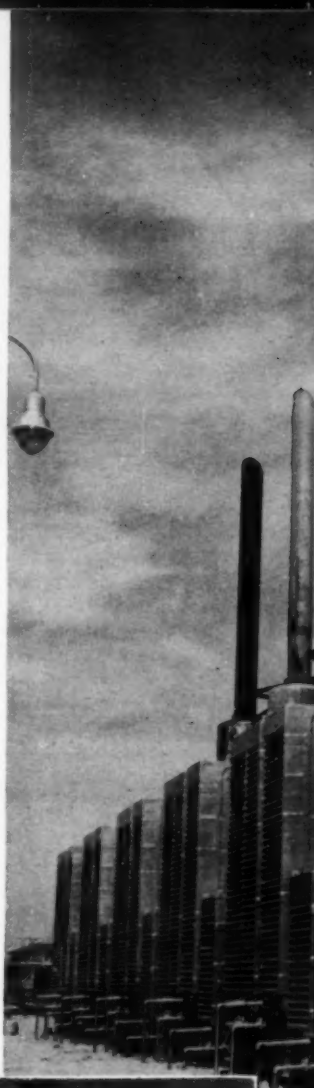
BUILDING NO. 42
D.C.

BUILDING NO. 40
A.C.

ON — POWER BUILDING —

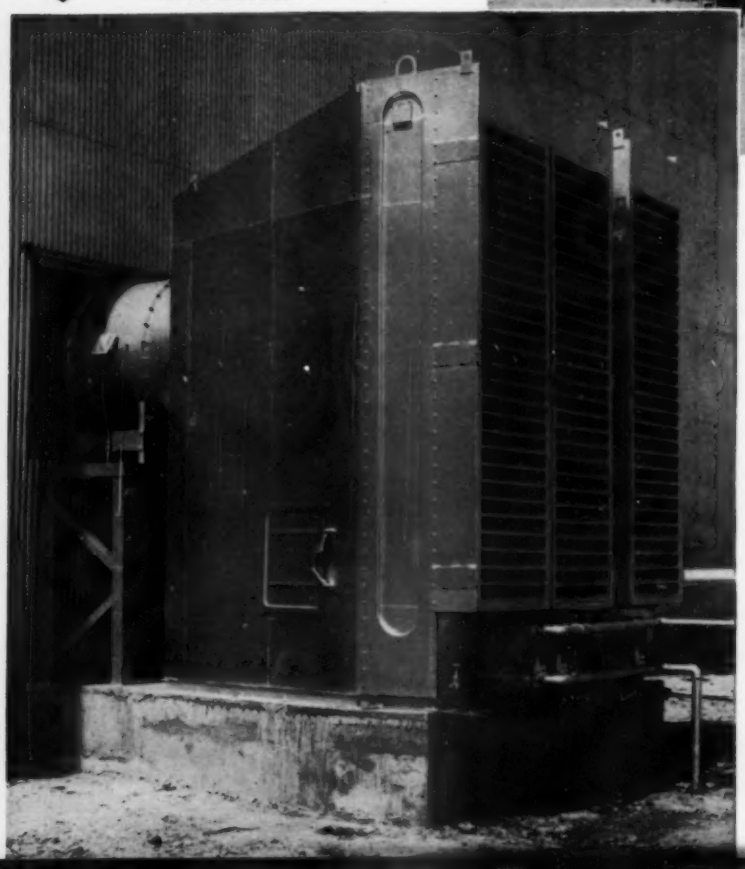
two motor driven 250 psi. discharge starting Gardner-Denver air compressors and four 92 cu. ft. 250 psi. starting air receivers. These three sets of starting air auxiliaries in the Cooper-Bessemer powered buildings are tied together by air lines, so that all three sets of starting air auxiliaries may supply 250 psi. starting air to any particular engine or group of engines. 100 psi. air for general service in the power buildings is obtained by pressure reducing valves from the 250 psi. systems, and also by supply from the main plant 100 psi. system. The main plant 100 psi. system also acts as a standby for the 250 psi. system in supplying control air to the individual engine controls and devices.

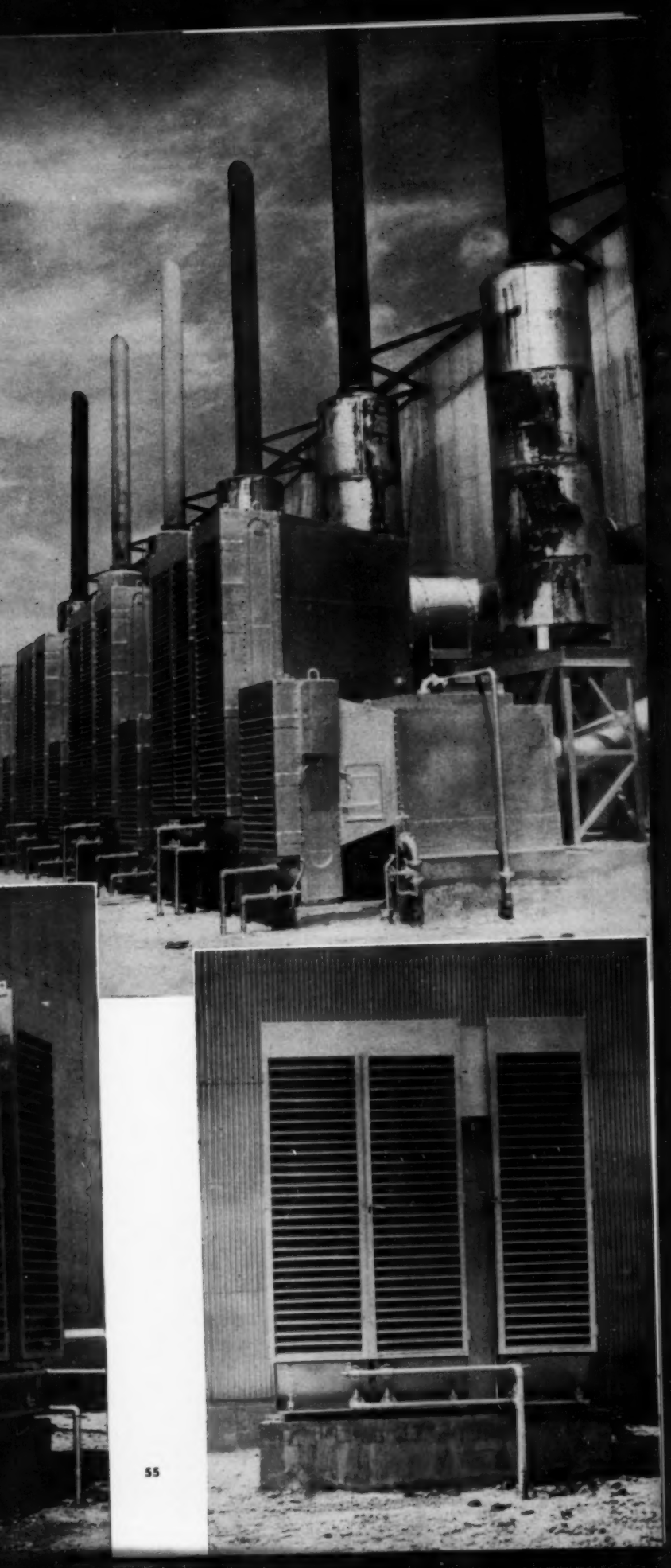
Fuel gas is brought into each of the engine buildings from the common plant system at a pressure of 100 psi. Gas is delivered to each engine at the longitudinal plant headers, and is taken through a gas pressure reducing valve to reduce it to a pressure of about 19 psi. for the individual engine. The gas passes from the pressure regulator through a gas expansion tank which has sufficient volume to smooth out impulses in the gas supply to the engine itself. The gas supply valve on the engine is pneumatically operated by the control lever on the engine control cubicle.



In the foreground the small units consist of an American air filter conditioning the combustion air for each engine, backed up by a Marley redwood evaporative cooler. Adjoining is one of the large American air filters conditioning the building intake air. Behind are six of the Burgess Snubbers muffling the exhaust on all eighty-three engines.

To left, close-up of American air filter of the automatic, self-cleaning, continuous screen, oil immersion type, conditioning the building air. Smaller but similar units are used for filtering the combustion air. To the right, front view of same unit.





Each engine has a self-contained recirculating jacket water system, which has a level maintained above the outlet of the engine. Jacket water is discharged from the engine into a vertical standpipe off the forward end of the engine. The 700 gpm. motor driven jacket water pump takes suction from the bottom of the standpipe, and discharges through the jacket water coils in the outdoor radiator. The cooled water is returned from the radiator to the dual engine jacket water inlets. Water level in each engine system is maintained by an automatic float control in the standpipe, from the building supply header.

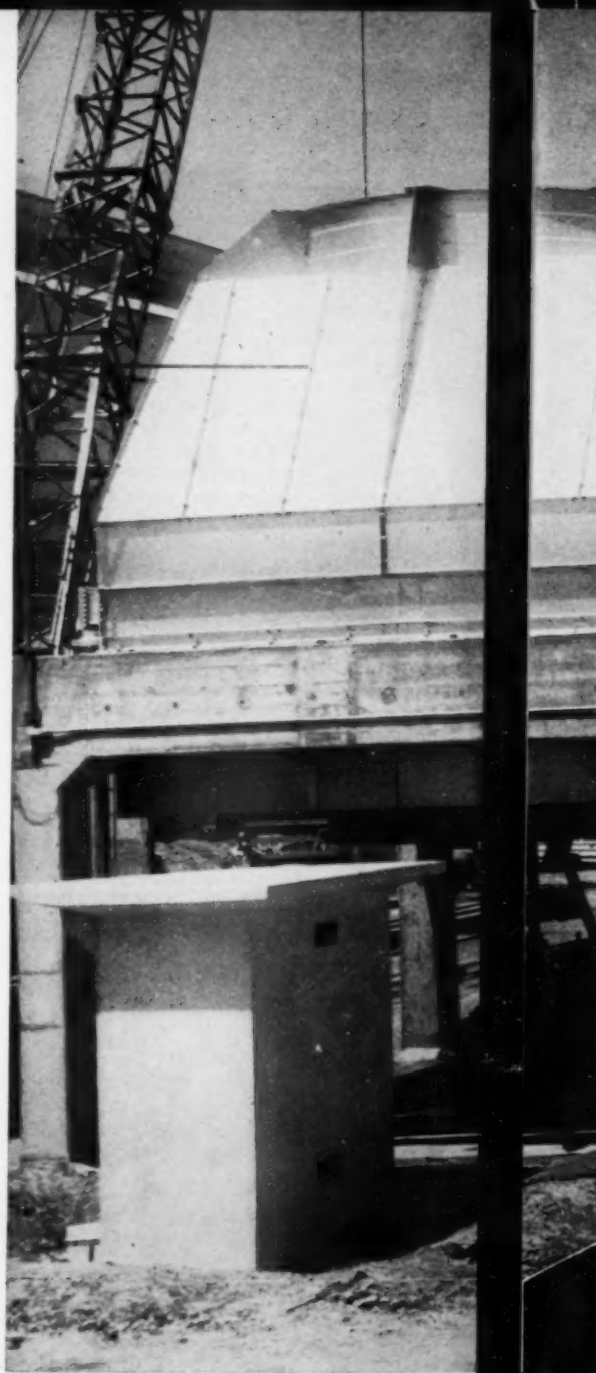
The cooling task totally is a gigantic one. The 83 gas engines develop a total heat of 543 million Btu. per hr. which must be dissipated. The lubricating oil also is cooled in the same assembly that cools the jacket water. Young Radiator Company supplied the entire assembly to cool the 83 engines: lube oil cooling coils, jacket water cooling coils, water manifolds, fans, fan shrouds, fan support tripods, fan shafts, fan shaft bearings and couplings, gear boxes, electric space heaters in the plenum chambers to prevent freezing.

For the Cooper-Bessemer engines the Young Radiators are of the HC-horizontal tubular type with a horizontal fan which forces air through the radiator for a vertical discharge from the radiator stack. Each unit has two copper water cooling coils, one pass, with ⅝ in. od. x .035 tubes rolled into the steel tank, and aluminum fins. Water and oil tanks are of fabricated steel. The finned face dimensions of the water coils are 72 in. x 180 in. Water coil manifolds, 6 in. IPS, connect the two water coils in series for water flow. Each unit also has one single-pass copper oil cooling coil. They utilize ¾ in. od. x .035 tubes, aluminum fins, and patented Young turbulating-type agitators, inside the tubes. The tubes are rolled into steel tanks and the agitators are removable for easy maintenance. The finned face dimensions of the oil coils are 66 in. x 180 in.

Each radiator has a capacity for dissipating 4,440,000 Btu/hr. from the jacket water, and 1,056,000 Btu/hr. from the lube oil. This represents a total heat dissipation for each engine of 5,496,000 Btu/hr. These radiators for the Cooper-Bessemer engines are specified for dissipation of this considerable amount of heat at a dry bulb temperature of 110 degrees F. Thermostatic controls are provided to control automatically the temperature of the jacket water leaving the radiator at 155 deg. F., and the lube oil entering the radiator at 160 deg. F. The temperature control thermostats have bulbs immersed in their respective liquids, and independently actuate the lube oil or jacket water modulating shutters on the upper side of the radiator tube sections. This equipment has an innovation in controls in that the two speed fan motor contactors are controlled by the position of the jacket water modulating shutters. This results in automatically regulating the speed of the fan motor to suit the actual heat dissipation requirements of the unit, which will depend both upon load and ambient air temperature. This permits the fan motor to be automatically set to draw the full speed 30 hp. or the half speed 7.5 hp., whichever may be actually required by the needs of the engine. In the plenum chamber below the radiator coils there are mounted four heating units, which come on automatically when the unit is not in operation and when air temperatures are below 50 deg. F., to prevent the lube oil from congealing or the jacket water from freezing in the radiator tube sections. At full speed the radiator fan will force the hot air stream to a height of 125 to 175 ft. above ground level.

The 41 General Motors engines use Young VAD-type units. Each unit has four vertically-mounted water cooling coils (two on each side) and two vertically-mounted oil cooling coils (one on each side). The single-pass water coolers use an aluminum core. The ⅝ in. x .049 tubes are ferruled and rolled into the steel tank. The tanks are of fabricated steel, the same as those used on the units for the Cooper-Bessemer engines. Core face dimensions are 48 in. x 150 in. Water coil manifolds are 6 in. IPS to connect the coils in series for water flow. The single-pass low pressure drop oil cooling coils are of ¾ in. x .049 tubes, ferruled and rolled to the tank. Fins and patented Young turbulating-type agitators are also aluminum. Easy maintenance is insured because the ferrules are large enough inside to permit withdrawal of the agitator chains. Finned face dimensions are 69 in. x 150 in. The fan shroud rests on the concrete end walls, and the coils and stack are supported by the walls. The tripod and fan assembly is based entirely on independent foundations clear of the main frame and coil structure, so that no vibration is transmitted from moving parts to the coils. Welded steel tripod, fan shaft and gear box were assembled and aligned at the factory to reduce assembly cost at the site and assure perfect alignment. Spiral bevel gears with extra heavy bearings are used. These are assembled, run in for check, torn down and reassembled for accuracy and sureness of continued operation. The entire weight and thrust of the fan is carried on the combined thrust and radial type bearing at the top of the tripod and none on the gear box bearings. Flexible couplings in the fan shaft and in the power input shaft to the gear box insure no strain on those parts.

Each Cooper-Bessemer engine has its own self-contained lubricating oil circulating system, containing some 1600 gallons of oil per engine. The oil sump is in the engine base from which the 420 gpm. motor driven lube oil pump takes suction through a single basket suction strainer. The lube oil pump discharges through the Young radiator back to the main lube oil filter. This filter contains replaceable wound yarn type cartridges, and can be bypassed for replacement of cartridges while the engine and its system are in operation. Oil is taken from the filter through a duplex strainer back to the engine where it is controlled by a pressure regulating valve. Oil pressure on the engine header is maintained at 25 to 30 psi. Connections are provided to the engine sump and various points in the engine recirculating system, both for separate motor driven pump scavenging of the engine system and for refilling the lube oil system of the engine with new or reconditioned lube oil.



Engine intake air is filtered to remove the fine particles existing in the air around aluminum reduction plants, and also any surface dust or sand, by American air filters of the automatic, self-cleaning, continuous screen, oil immersion type. For the Cooper-Bessemer units engine air is led through this filter to an air precooler of the Marley evaporative wood filled type. After the air passes through the turbocharger, it is again cooled in a Young after-cooler. Cooling water for the two turbocharger aftercoolers on each engine is provided from the basin of the Marley evaporative air precooler. The temperature of the air in the engine air manifold is maintained at a set temperature, by a thermostatic three way valve which controls recirculation in

the system by the aftercooler water centrifugal pump. The aftercooler water pump is automatically cut off at low outdoor air temperatures.

The Burgess model STC exhaust snubber was chosen to meet the high quality of silencing of the engine exhaust considered necessary at the San Patricio plant. This plant is located rather near Corpus Christi Bay, with Corpus Christi across the bay and other towns considerably closer. It was felt essential to avoid exhaust sound transmission across the water by installing high degree exhaust muffling equipment.

The heat liberated in the generating buildings by the generators themselves, and from radiation by the engines and piping, plus the requirement of pressure in the generating buildings to prevent the dust in the outdoor air from entering the power rooms, require the use of a forced air ventilating system. In the two Cooper-Bessemer buildings, based on calculated requirements on heat radiation and loss from the engines and

Six of the Young Radiator heat exchanger units servicing the Cooper-Bessemer Engines. Diagram shows a Young cooling unit for lube oil and water, the American Air Filter combustion air filter, the Marley engine air pre-cooler, and the American Air Filter building ventilating unit.

generators, there has been provided a ventilating air supply of 64,000 cfm. per engine, to be effective with a pressure of ¼ in. of water in the building. Air for this ventilating system is drawn in from the outside through the same type of American automatic self-cleaning, continuous screen, oil immersion type of air filter as used for the engine air intake, but incorporated in separate units.

Each building ventilating air filter for an individual Cooper-Bessemer engine-generator unit has a horizontal dividing plate in the plenum chamber to direct the air from the filter to an upper or lower fan. These fans are of the axial flow type mounted directly in the air ducts to the building, and supply 30,000 cfm. from the lower blower and 34,000 cfm. from the upper blower. The lower blower discharges to a duct underneath the floor running beside the engine foundation block. Outlets are provided to take off 2,000 cfm. in each of the two forward end of engine trenches, 20,000 cfm. which is led by deflectors to the rear surface of the generator where it can be picked up by the generator cooling fans, and the remaining 6,000 cfm. is discharged between crane columns at the generator end of the engines.

The top ventilating fan duct discharges 34,000 cfm. in the Cooper-Bessemer engine rooms above the individual engine auxiliary motor control cabinet. The discharge from this duct is pointed downward at a point midway between the engines, and deflectors are provided to fan out the air stream horizontally. Additional 34,000 cfm. air filter and fan groups are provided at the center bays for the ventilation of the switchgear and common auxiliary areas in the centers of the buildings. Intentionally the building cooling air is not cooled, as it has been found that water cooling such building ventilating air introduces serious problems in additional moisture pickup in generator windings, on metal surfaces, and in various electrical windings and instruments.

The unloading, storage, supply and reconditioning of engine lubricating oil and of air filter oil is in a separate building set aside for the necessary equipment, centrally located in an oil tank farm, beside a railroad spur and a truck roadway. Separate storage facilities have been provided for lubricating oil for the Cooper-Bessemer and the General Motors units, to allow for use of different types of lubricating oils, should this be advisable. New lubricating oil storage consists of one 15,000 gallon storage tank for each type of oil. This arrangement is repeated for clean or reconditioned lubricating oil. There are two 2,000 gallon storage tanks for each type of oil as withdrawn from the engines for reconditioning.

New lubricating oil, as unloaded from tank car or truck is metered and put through a strainer and filter before pumping it to storage. Pumping equipment in the oil handling building draws this oil from storage and delivers it through strainers and meters in the individual power generating buildings, to individual units. New oil will largely be used for makeup. Used lubricating oil is pumped from storage through U.S. Hoffman vaporizer type reconditioning units, then to clean oil storage. This oil is then pumped through strainers and meters in the individual power generating buildings to individual units, as is the new lubricating oil. This reconditioned oil will largely be used for recharging engine systems. As previously discussed, the lubricating oil scavenging pumps and meters for withdrawing lubricating oil from individual units are located in the power generating buildings. This equipment transfers used lubricating oil to storage in the oil tank farm. Currently Phillips 66-HD lube oil is being used in the Cooper-Bessemer engines.

One common air filter oil handling system is provided for the entire plant. Tank truck or car unloading equipment, in the oil building, pumps and meters oil to two 8,000 gallon tanks used for both new and reconditioned air filter oil. New and reconditioned air filter oil is drawn from storage by oil building pumps, and delivered to any of the engine air or buiding ventilating air filters. Dirty air filter oil is withdrawn from the air filter sumps by scavenging pump in the individual power generating buildings, and is pumped to three 1200 gallon dirty oil storage tanks. These tanks have cone bottoms to permit settling out and draining off as much as possible of the water and dirt in the oil. This reduces maintenance on the air filter oil reconditioning equipment. Air filter oil is withdrawn from the settling storage tanks, and is cleaned in a battery of three Sharples centrifuges, then pumped to new and reconditioned oil storage. The whole system contains some 56,000 gallons of viscosene air filter oil at all times.

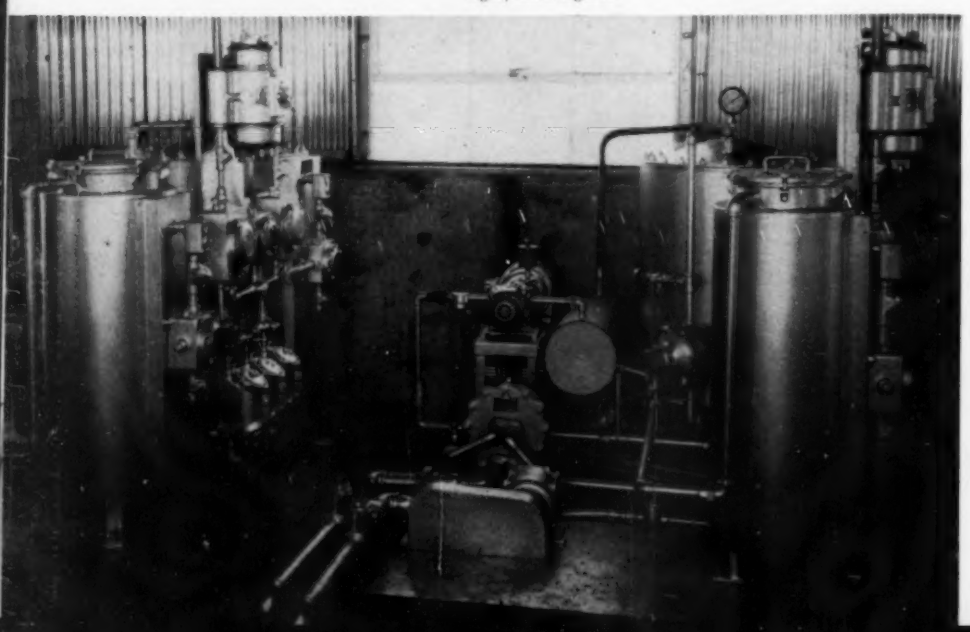
Oil handling building motors and centrifuge controls are explosion proof. Storage tanks are surrounded by dikes to retain oil in event of leakage. Metering is provided to determine the amount of lubricating oil unloaded, and that is used by any of the power generating buildings, or by any individual engine-generator unit. The amount of lubricating oil returned for reconditioning is also metered. Air filter oil is metered as unloaded, and as reconditioned and returned to storage.

When I described the units mounted on and within the control cubicles which are located adjacent to each engine, I briefly referred to the scanning pyrometer. But I would like to say a little bit more about it here, because it offers some unique advantages in connection with control of large units of engines. The Bristol Diesel Engine Scanning Pyrometer, which is used on the Cooper-Bessemer engines, is designed to measure the temperatures of the engine cylinder exhausts and the turbochargers. A motor-driven selector switch scans the sources of heat in a regular sequence, making one complete cycle in 161.7 seconds. The instrument actuates one alarm when any of the measured temperatures exceeds a preselected high limit and actuates another alarm when any of the measured temperatures is less than a preselected low limit.

The Bristol Diesel Engine Scanning Pyrometer installed on the control cubicles for the G-M engines is designed to measure the temperatures of the engine cylinder exhausts, the generator bearings, and the air adjacent to the generator windings. A motor-driven selector switch scans the sources of heat in a regular sequence, making one complete cycle in 161.7 seconds. The instrument actuates an alarm when any one of the measured engine exhaust temperatures exceeds the preselected high limit, and also if any of the measured engine exhaust temperatures is less than the preselected low limit. Because the preselected high limits of the engine exhaust temperatures and the bearing and air temperatures are different, automatic switching circuits are provided to change the range of the millivoltmeter mechanism so that the same high alarm setting can be used for all of the temperature measurements.

In both the Cooper-Bessemer and the General Motors control panels the Bristol Pyrometer continuously and visually reads the exhaust temperatures of all cylinders at a speed low enough for the floor operator to copy on his record sheet at given specified intervals of time the actual ex-

U. S. Hoffman vaporizer type lube oil reconditioning units in pump house serving all eighty-three engines.



haust temperature of each cylinder of each engine, plus on the Cooper-Bessemers, the turbocharger temperatures on each side of each engine, and on the G-M engines the generator bearing temperatures and the generator air circulating temperatures.

Another of the interesting instruments contained within the Cooper-Bessemer control cubicles, not mentioned in too much detail earlier in this article, is the Mechanical Air Controls' 3-way Solenoid operated air valve. The three basic units on each installation (1) allows air pressure to be applied or exhausted from the instrument panel, (2) starts the engine, and (3) acts as a safety control in case anything goes wrong. This is the first time that I have come across the use of the MAC air valves in an installation of this type.

Getting back to the handling of the lubricating oil for the moment, the oil is not subjected to any other treatment, other than constant circulation through the FullFlo unit until it is taken out of each engine and returned to the pump and service room which is a manually controlled system of returning oil to storage. And this is done, based on a report from the testing laboratory here at the plant which runs samples through at regular intervals from each engine, and when the analysis of the oil calls for return to storage then the lube oil scavenging pump is turned on and the oil goes from the base of the engine back to the dirty tank farm, then through the Hoffman vaporizer and reclaiming unit, of which there are three complete sets, and back to the clean oil tank. The Hoffman units, of course, boil off the water and other contaminants, and generally do a job of reconditioning. Two of the Hoffman sets have a capacity of 300 gal. per hr. and the other a capacity of 50 gal. per hr.

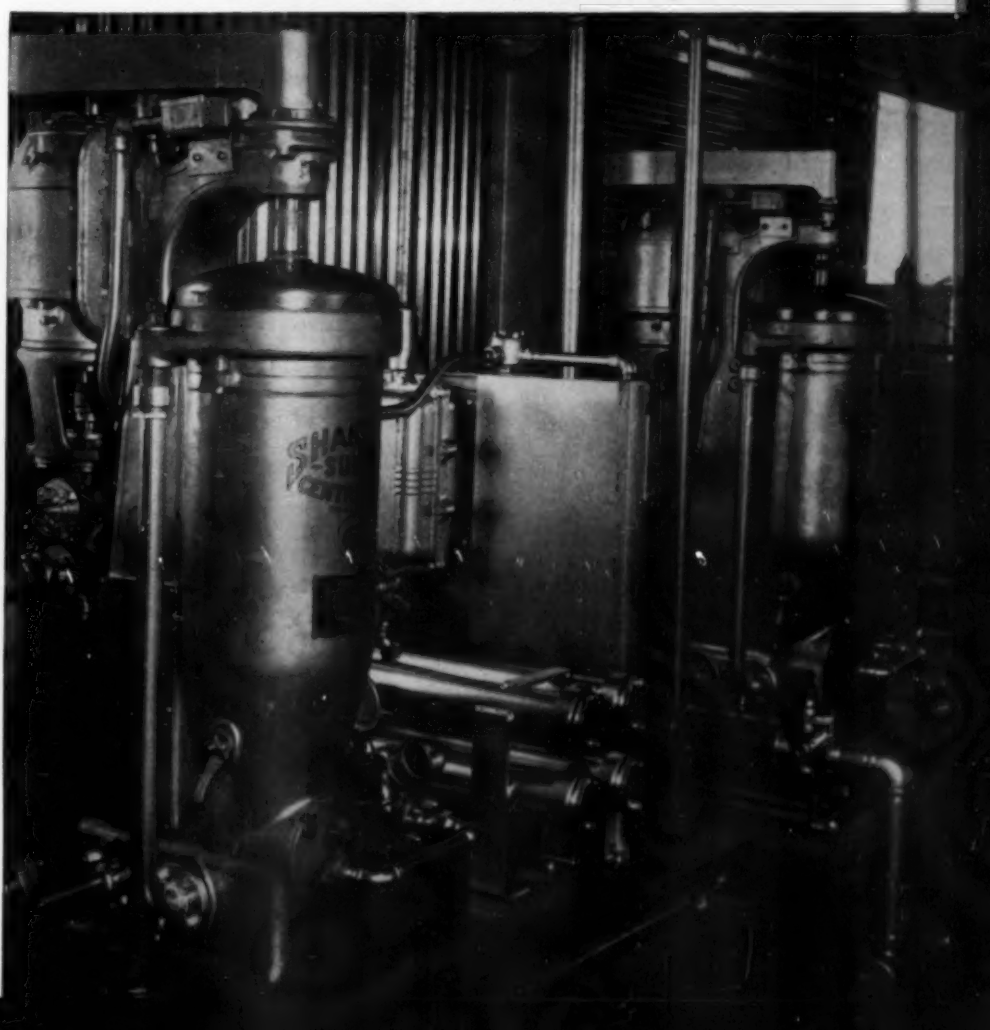
As I bring this article to a close I want to extend my sincere appreciation to Mr. L. A. Amos, Reynolds plant manager here, who has extended every courtesy to me, and every facility to me to produce an interesting and exhaustive article on the power plant of the Reynolds Metals Company here at Corpus Christi. And then, of course, the man who was able to answer so many of the questions pertaining to the engines and to the power plant, Mr. E. L. Murphy, who is the power plant superintendent here, and will be the man responsible for the successful operation of these 83 big gas engines. Mr. Murphy is no tyro at this business, because he has been responsible for quite a long time prior to coming here for the successful operation of the Jones Mills, Arkansas Reynolds Metals diesel engine plant, which was built in the early days of World War II. Inasmuch as this article has dealt mainly with the Cooper-Bessemer engines here, I found the cooperation of Mr. Frank L. Friedli and Mr. Robert Lay of the Cooper-Bessemer Corporation tremendously useful. These men have lived with this plant from its drafting room days right through to the current time, and their enthusiasm for it is unbounded, and for a good reason—it is a fine plant.

As I told you earlier I want to come back here this Fall when I can do a better job of describing the General Motors end of this power plant. Their engine here is new, it's different, and I am going to tell you about it as soon as building 42 is ready to photograph and ready to talk about. It's been a mighty interesting experience to me to have the opportunity of wandering through this huge plant for the last four days. I've seen many new things, many interesting things, and I hope I have passed on to you the important developments here as I saw them. It is still a little difficult for me to realize that I have been talking about one power plant containing 240,000 hp. of natural gas engines—any way you look at it that's a big plant.

List of Equipment for Cooper-Bessemer Engines

Engines—42 Cooper-Bessemer V-type, 16 cylinder 15½ in bore, 22 in. stroke, 3700 hp./327 rpm.
Generators—General Electric: 2500 kw. ac., 327 rpm., 4160 v.; 2500 kw. dc., 327 rpm., 725 v.
Hydraulic Engine Governor—Woodward.
Overspeed Governor—Pickering.
Exhaust Silencers—Burgess Manning.
Engine and Building Intake Air Filters—American Air Filter Co.
Engine Air Intake Pre-Coolers—The Marley Co.
Lube Oil and Jacket Water Radiators—Young Radiator Co.
Building Ventilating Fans—Joy Mfg. Co.
Engine Lube Oil Pumps—DeLaval IMO.
Lube Oil Filters—Cooper-Bessemer Commercial FullFlo.
Lube Oil Pump Suction Strainers—Elliott Co.
Lube Oil Pump Discharge Strainers—Elliott Co.
Fuel Gas Pressure Regulators—Fisher Governor.
Engine Control Cubicles—Gen. Electric.
Auxiliary Motor Control Cubicles—Gen. Electric.
Cubicle Gauges—Manning, Maxwell and Moore.
Manometers—Meriam Instrument Company.
Scanning Pyrometers—The Bristol Company.
Thermometers—Taylor Instrument Co.
Lube Oil Transfer Pumps—DeLaval IMO.
Viscosene Transfer Pumps—DeLaval IMO.
Air Compressors and Air Tanks—Gardner-Denver.
Lube Oil and Viscosene Meters—Bowser, Inc.
Lube Oil and Viscosene Air Eliminators—Bowser.
Lube Oil Reconditioners—U. S. Hoffman Co.
Viscosene Reconditioners—The Sharples Corp.
Motor Generator Sets—General Electric.
Amplidynes—General Electric.
Engine Turbochargers—Cooper-Bessemer.
Liquid Level (Oil) Control—Magnetrol, Inc.
Piston Rings—Pedrick.
Lube Oil—Phillips 66-HD.
Contactors in Cubicles—Detroit Lubricator.
Storage Batteries—Exide.
Solenoid Air Valves—Mechanical Air Controls.
Expansion Joints—Zallea.
Piston Rings—Pedrick.
Crankshafts—Ellwood City Forge Co.

Two of the three Sharples super-centrifuges in the pump house which are used to recondition the air filter oil from the eighty-three engines installed in this plant.



SIOUX FALLS, SOUTH DAKOTA

One 1500 Hp. Nordberg Operates 96 Per Cent of Time, Generates 71,239,000 Kwh. in South Dakota Municipal Power Plant

By A. T. HANSON*

IN an impressive marathon performance, one 1500 hp. Nordberg diesel engine in the Sioux Falls, S. D., municipal power plant has been in service more than 96 per cent of the time for 14 years, amassing a total of 117,935 engine hours. In that time, this moderate-sized diesel has produced 71,239,000 kwh. It is not unusual in this plant to run the unit for a solid year without shutting down. At the time this article was written, the engine was in its 15th month of continuous operation. I have not been trying to set engine endurance records. I simply am meeting load conditions which make it imperative to keep our major prime movers at work and I think we have done a noteworthy job in satisfying the heavy demand on the generating facilities. In 1950, the peak load carried by the plant was 2,500 kw. Total plant capacity is 2,590 kw.

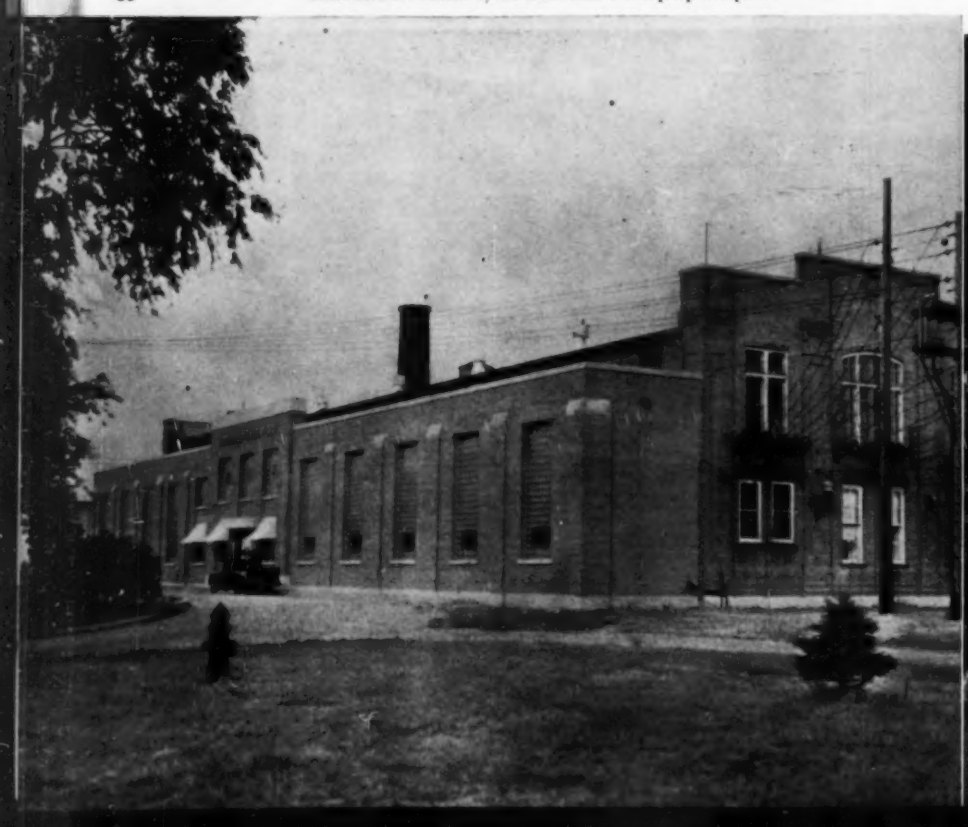
This is not the usual story of municipal plant development in which the electric department is in effect a city-owned utility serving all the needs of the community. At Sioux Falls, South Dakota's largest city with a population over 50,000 power production began as a by-product of the water works. A steam plant started pumping water in 1903 and began turning out a little electricity for street lighting in 1906. In 1915, the city installed in the water plant two 165 hp. Busch-Sulzer air-injection diesels to drive pumps and also small generators. In this remarkable plant, where old engines never die, these 36-year-old veterans still turn the pumps for thousands of hours a year.

The first engines installed wholly for electric service were two 520 hp. air-injection Busch-Sulzer diesels, the first of which was put on the line in 1917, the second in 1919. In 1950, the first unit ran 3,018 hours and the second 2,468 hours. The next pumping engine was a 400 hp. McIntosh & Seymour diesel, installed in 1926 and still the mainstay of the water plant. In 1933, Sioux Falls put in a 1250 hp. air-injection two-cycle Nordberg diesel. By the close of 1950, this engine had been in service more than 105,000 hours. In 1950 alone, the unit ran 6,208 hours and generated 2,772,000 kwh. Then, in 1936, the plant added its largest engine, a 1500 hp. two-cycle, Nordberg air-injection diesel.

Needless to say, a plant of this modest size does not supply the needs of 50,000 residents and the commercial and industrial requirements of this community. This primarily is a plant to handle the city government's own requirements. In 1950, of the 9,597,875 kwh. sold, 5,120,873 kwh. went to the municipality for street lighting, light, power and water heating for schools and other public buildings, power for the water department and for the sewage plant. The remaining 4,477,002 kwh. went to private consumers for residential lighting, commercial light and power, and water heating. The private sales constitute about 8 per cent of Sioux Falls' total consumption of electricity, with a private utility company supplying the other 92 per cent. Top power policy director John M. Browning, who recently was reelected for a five-year term as Commissioner of Water and Light, explains that the city and private utility do not regard themselves as competitors. The city has, upon occasion, supplemented its own production with purchased power to meet the growing requirements of its departments and customers. Through the years, both the city and the utility have slashed rates to private consumers, keeping their scales about equal. When the first diesels were installed, the city's rate was a flat 13 cents per kwh. Today, the residential rate ranges from a maximum of 5 cents down to 1 cent per kwh.

*Chief Engineer, Municipal Power and Light Plant

Lighting and power needs of all city departments as well as a portion of the private consumer load are carried by the Sioux Falls municipal power plant.



Four veteran diesels carry the heavy load of the Sioux Falls plant. From the right are the 520 hp. Busch-Sulzer installed in 1919, the 1250 hp. Nordberg installed in 1933, the 520 hp. Busch-Sulzer installed in 1917 and the 1500 hp. Nordberg installed in 1936.

Despite the successive rate reductions in the past 20 years, the city has transferred a net of $621,789.15 from the light department earnings to other funds. This combination of low rates and large profits means that the plant through the years has produced power at moderate cost. For the full 14-year period, the 1,500 hp. diesel consumed 5,854,852 gal. of fuel oil in producing its 71,239,000 kwh., an average of 12.16 kwh. per gal. The four engines in the electric plant used 9,968,612 gal. of fuel in generating 120,372,962 kwh., an average of 12.07 per kwh. per gal. By 1950, the efficiency of the over-worked engines was still 11.21 kwh. per gal. of fuel and I am confident that a proper overhaul—long past due—would restore the units to new-engine performance.

These diesels use a 21 gravity Miranda crude oil which costs the city 9.75 cents a gal. delivered. The fuel has a cold test of 50 below zero, an important matter in the Dakotas where winters are cold. The fuel is delivered in tank cars and unloaded from the top by a pair of motor-driven pumps which can handle two 10,000 gal. tank cars a day. There are 22 storage tanks with a total capacity of 260,000 gal. The fuel is centrifuged and the purified oil is stored in six underground tanks with total capacity of 66,000 gal. From these tanks, the fuel goes to individual day tanks and through meters and filters to the engines.

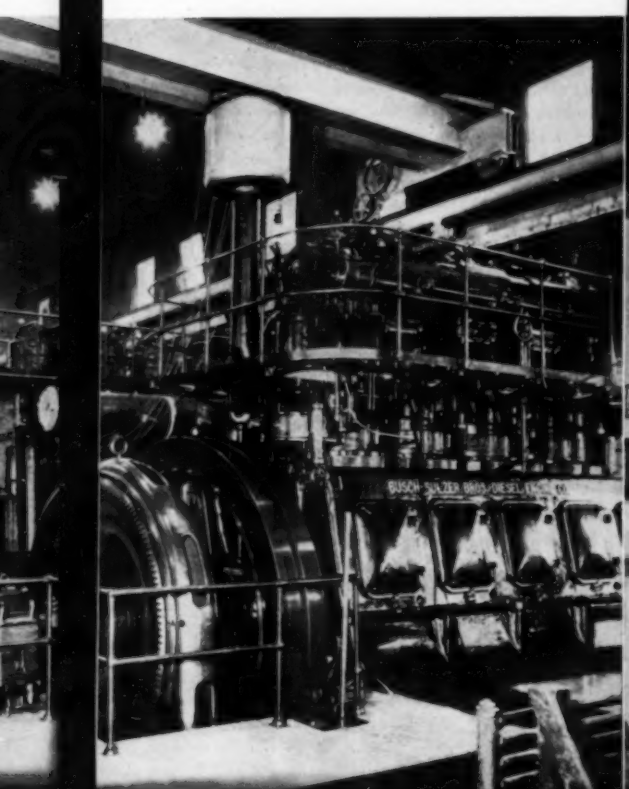
Engines must be well lubricated to maintain the operating schedule of the Sioux Falls plant. A heavy-duty detergent-type oil is used to lubricate the cylinders of the two Nordberg diesels and is used for both cylinders and bearings on the older engines. A straight mineral oil is used in the pressure system that supplies the bearings of the Nordberg engines. Crankcase lube oil is cleaned continuously in Fuller's earth purifiers. Some oil is bypassed from the pressure circulating system through an individual purifier for each engine and then returned to the sump. The efficacy of lubrication is indicated by the fact that the operators have never found a stuck ring on their big engine. Moreover, even after 117,935 engine hours, all but one of the engine's original cylinder liners are still in service. Lube oil consumption is not as low as I would like it to be—another price of deferred maintenance—but still it compares favorably with the experience of many much newer plants. In 14 years, the entire plant used 103,905 gal. of lubricating oil, an average of 2,927 rated hp. hrs. per gal. The 1500 hp. Nordberg, workhorse of the plant, used only 2,640 gal. of lubricating oil in 1950 while operating 8,546 hours for an impressive average of 4,855 hp. hrs. per gal. of lube.

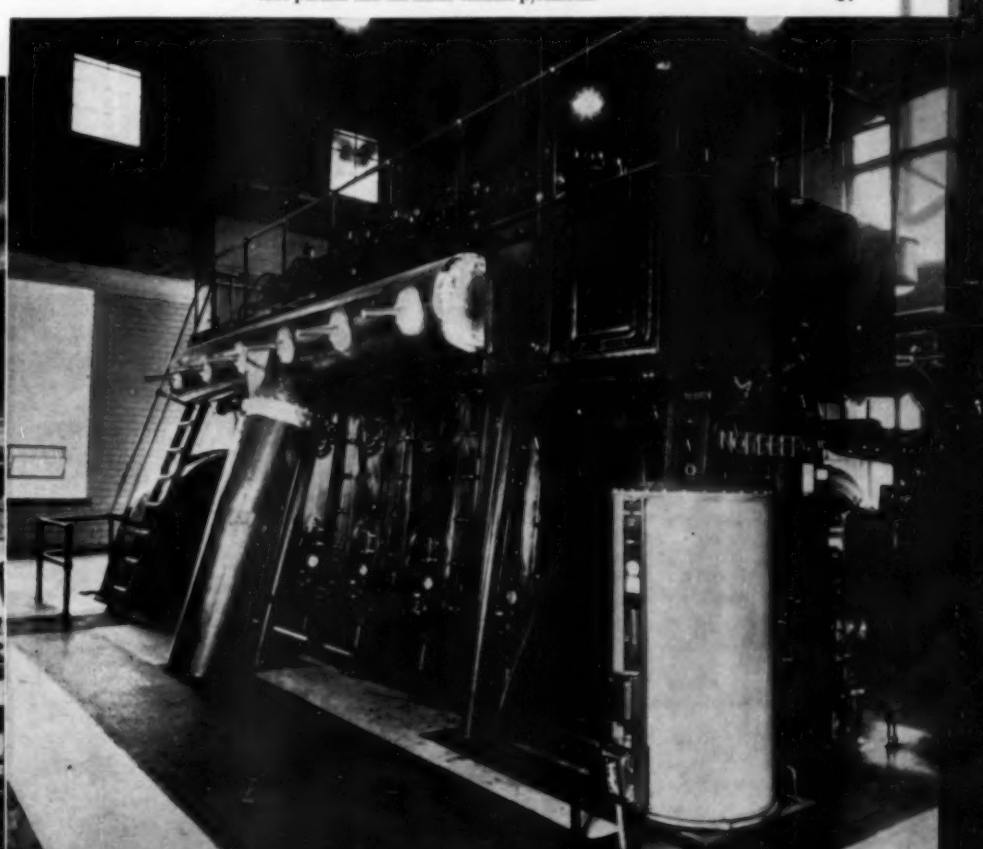
The plant has a closed cooling water system with a heat exchanger for each engine. Soft water is circulated by a 1500 gpm. motor-driven centrifugal pump with a second identical unit as a standby. There is also a 1200 gpm. standby pump driven by a gasoline engine. Raw water comes from the city's high pressure mains through the heat exchangers and oil coolers back to the clear well reservoir of the water plant. City water treated in a zeolite softener is used for makeup in the soft water circuit. Air for the Nordbergs is drawn through viscous impingement-type filters in the basement directly below the engine foundations and is supplied to the cylinders by the engines' scavenging pumps. Waste heat boilers on the Nordbergs' exhaust provide part of the steam heat for the building.

As indicated above, maintenance on the 1500 hp. engine is a problem, not because the unit is hard to maintain but because it is rarely available for maintenance. I have met the problem to a degree by working on the engine one cylinder at a time without shutting it down. For fuel pump maintenance, we just block off a cam, cut off the fuel pump for one cylinder and do our work while the diesel continues to grind out kilowatt-hours. When cylinder inspection is to be made, the engine is shut down at midnight, cylinder head removed and the piston pulled. After any necessary servicing, the unit is reassembled and is ready to be put back on the line at 6:30 a.m. Only one cylinder is inspected per night.

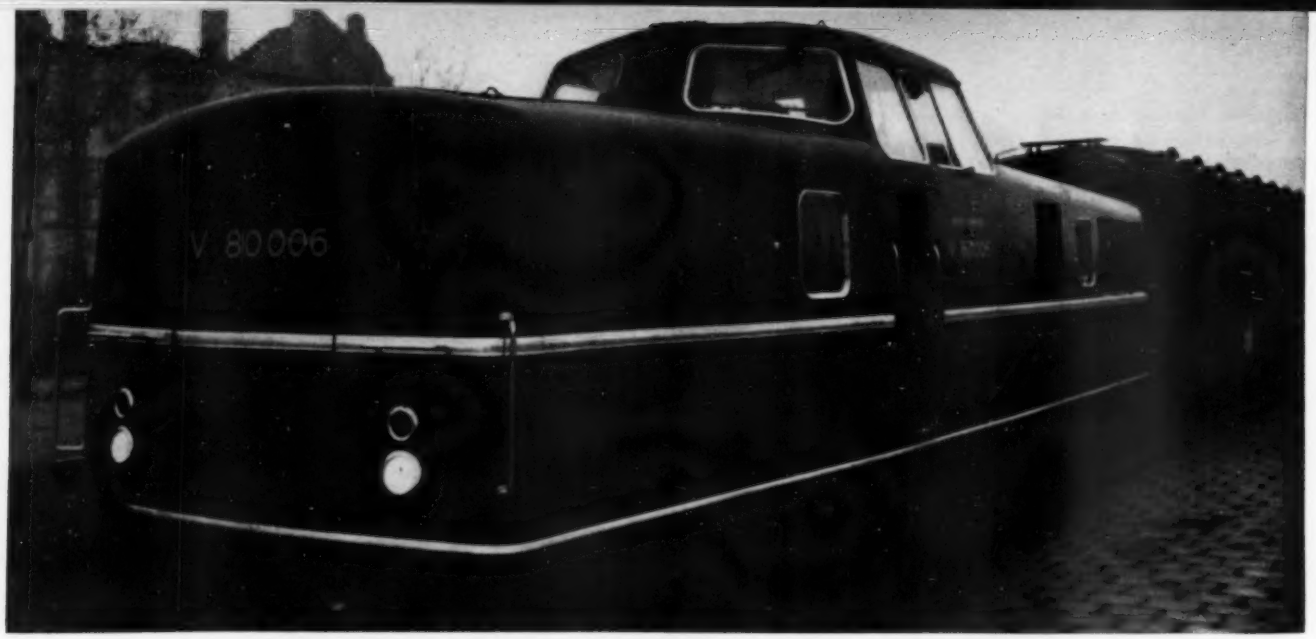
List of Equipment

Engines—One 1500 hp., six cylinder, 17-in. x 25-in., 257 rpm., two-cycle, air-injection. Nordberg. One 1250 hp., five cylinder, 17-in. x 25-in., 257 rpm., two-cycle, air-injection. Nordberg. Two 520 hp., four cylinder, four-cycle, air-injection Busch-Sulzer diesels.
Fuel oil—21 gravity Miranda crude.
Fuel unloading pumps—Viking Pump Co.
Fuel centrifuge—De Laval Separator Co.
Fuel transfer pump—Aldrich Triplex.
Fuel meters—Neptune Meter Co.
Lube oil—Texaco Ursa and Texaco Algol.
Auxiliary lube pump—Northern Pump.
Lube purifiers—Honan-Crane.
Cooling water pumps—Allis-Chalmers.
Lube oil coolers—Ross.
Heat exchangers—Ross.
Air filters—American Air Filter.Air-Maze.
Air compressor—Gardner-Denver.
Waste heat boilers—Foster-Wheeler.
Pyrometer—Alnor.
Cylinder lubricators—Manzel.
Governors—Woodward.





In 14 years the 1500 hp. Nordberg diesel has generated 71,239,000 kwh., at the rate of 12.16 kwh. per gal. of fuel consumed. This view of the unit also shows the Honan-Crane lube purifier and the Alnor exhaust pyrometer.



NEW GERMAN DIESEL LOCOMOTIVE

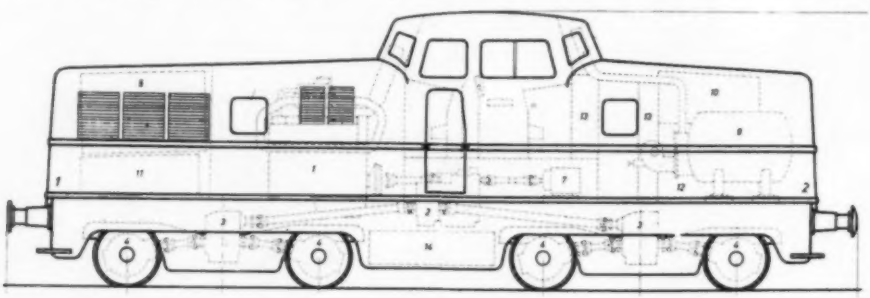
A new type of diesel locomotive, the V-80 series of the German Bundesbahn was recently released by the German Federal Railroad System in Munich. The unit is the product of a carefully planned co-operative venture on which the following firms collaborated. On the diesel engines: Daimler-Benz Corporation, MAN (Maschinenfabrik Augsburg-Nuernberg) and the Maybach Works on Lake Constance. On the transmissions: Voith Corporation and Maybach, also the locomotive plant of Krauss-Maffei. Further co-workers have been the locomotive producing plants of Henschel, of Krupp, of Machinenfabrik Essingen and of MAK in Kiel.

Three different engine types and two different transmission types have been used in order to keep competition between the participants alive. The units are so designed that they can be exchanged for each other. The V-12 diesels are equipped with turbines driven by the exhaust gases which in turn drive the superchargers. They are fast turning space-saving diesels of between 800 to 1000 hp. output. In order to be able to utilize several locomotives for the propulsion of one train, a multiple apparatus has been developed which enables a one man control from either one of the locomotives or from a car which contains the front operator's place. This new unit not only serves for the operation of the power plants but also watches over every function of the diesel engines such as oil pressure, water temperature, fuel pressure, etc. and it will shut off any engine on which something may be out of order and report to the engineer what it did and the reason.

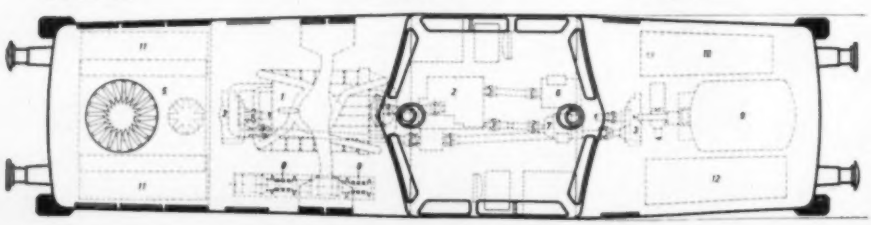
The main frame is welded and consists of steel tubing with cross members, while the body has been produced from quadratic tube profiles and is welded with sheet metal panels which make the unit something like one of the automotive unitized structures. The engineer has his seat in the middle of the locomotive while he can walk to the engine and to the steam heating sections one floor below, through doors and stairways. Every unit of the vehicle can be removed from the top.

The power of the diesel is transmitted either to the Voith triple hydraulic torque converter or to the Maybach Mekydro transmission which consists of a torque converter and four automatically shifting speeds. Both types of transmissions are fully automatic. Additional reduction and distribution transmissions carry the power to the pinion and ring gear axle drives over the universal joints and propeller shafts which are necessary in order to keep the unit well sprung and the wheel trucks, of two axles each, turning when the rails require it. The locomotive can be used for a top speed of about 60 miles per hour when pulling passenger or freight trains or 30 mph. when used in shunting yards. A 110 volt dc. generator generates the current for lighting and for the operation of the various armatures and instruments. A 300 ampere hour battery is also used. An oil-fired steam generating plant takes care of the heating requirements for up to six passenger coaches.

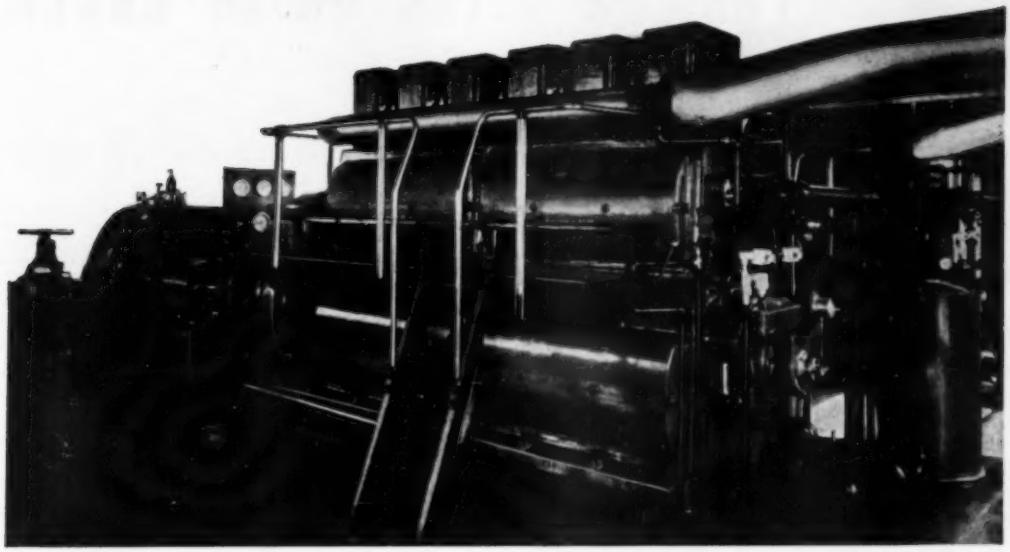
The length of the V-80 is overall 12.8 meters and the weight is 56 tons. The first ten units are now being delivered by Krauss-Maffei in Munich and by the MAK in Kiel. The V-80 is the first full-fledged German diesel locomotive and starts the beginning of a new era in the field of railroading in Germany. It is interesting to note that they have not followed the design of the popular diesel-electric combination which is in use in the United States. The application of the automatic transmission from the automotive field makes this unit interesting and shows what influences modern automotive design trends must have had in the minds of the designers of this new type of diesel locomotive.



1. Diesel engine
2. Automatic hydraulic transmissions
3. Reversing and distributing transmission
4. Axle drive
5. Radiators
6. Generator and starter
8. Supercharger
9. Steamboiler
10. Heating oil tank
11. Fuel tank
12. Water tank
13. Dash board



at the Anthony Station of Magnolia Pipe Line . . .



89.6% of elapsed time

for 11 years . . . that's Alco dependability

On-the-job performance—the toughest test of all shows what Alco Standardized Diesels can do. Two of these engines installed at the Anthony Station of the Magnolia Pipe Line have each rolled up over 90,000 hours of operation since installation. They have run as much as 94.9% of the elapsed time in a single year.

In addition to this kind of performance, pumping station superintendents also like Alco Standardized Diesels because of their economy:

- **Compactness** for lower construction costs
- **Higher engine efficiency** for lower fuel costs
- **Medium speed** for lower auxiliary equipment costs
- **Flexible power range** for lower expansion costs

In the last ten years *more Alco Diesel Engines have been installed in oil pipe line pumping service in the United States and Canada, than any others.* To find out how they can help you, contact your nearest American Locomotive Company Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, New York, San Francisco, Schenectady or St. Louis.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY

***In step with tomorrow*—ALCO AIRCOOLERS, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe**

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

New Diesels and Gas Turbines for The Royal Navy

THE Admiralty announces that a new light weight, high powered diesel engine known as the "Deltic" has been designed and developed for the Royal Navy by Messrs. D. Napier, of Acton, on behalf of their parent company, The English Electric Company Limited. It takes the form of an opposed piston two-stroke cycle engine with a power rating up to 2,500 bhp. and is constructed in triangular form with three crankshafts. Modern naval warfare involves the use of light displacement craft of high speed. To ensure maximum operating range these craft require light weight propulsion machinery of as low a fuel consumption as possible.

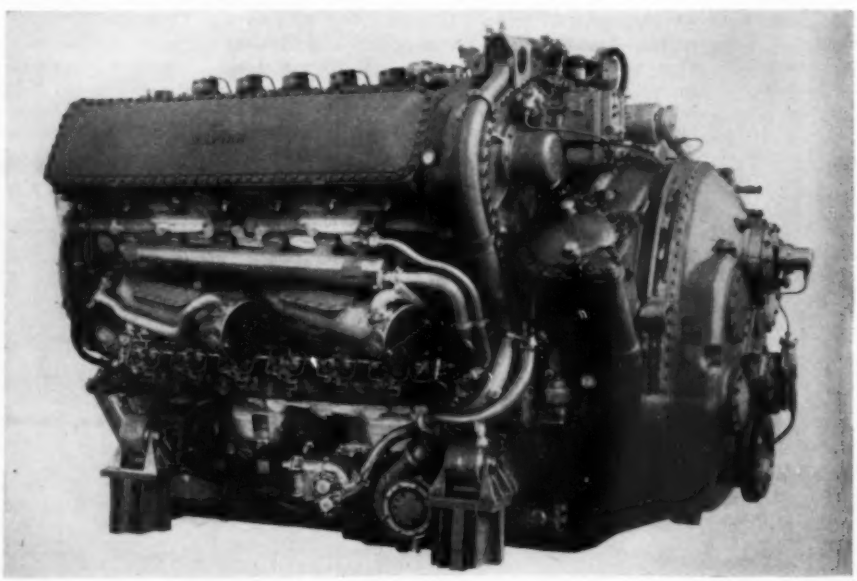
Because no suitable diesel engine has been available, it has hitherto been necessary to power such craft with petrol engines, the high fire risk and other limitations associated with such engines being accepted.

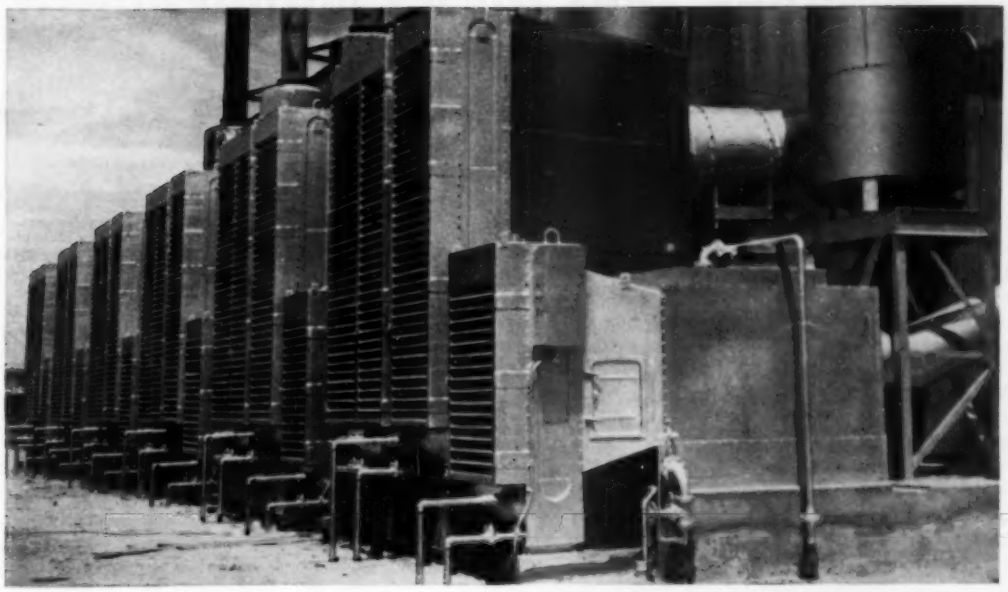
The development of the "Deltic" Engine will allow petrol engines to be superseded in such applications with great advantage to the Royal Navy. The new engine will give increased performance of the craft together with improved reliability and will reduce maintenance requirements. Development tests at the Acton works of Messrs. Napier have been successful and the engine has proved itself to be acceptable for service. The "Deltic," with its triangular formation, takes its name from the Greek letter "Delta."

Addressing the Diesel Engine Users' Association at its Annual Luncheon, on the 17th April, the Engineer-in-Chief of the Fleet, Vice Admiral the Hon. Sir Denis Maxwell, K.C.B., C.B.E., gave details of the new "Deltic" engine and sketched the background of the powering of the Royal Navy's smaller ships. He said: "Between the wars the use of diesel engines was gradually extended as suitable designs became available, in particular in boats and as auxiliary generating sets in destroyers and other smaller classes of ship. Their use in submarines, of course, continued. The second world war led to a very large increase, and engines of British and American manufacture were used in the multitude of landing craft, harbor defense and other small types of vessel. It is of interest to note that the hp. of diesel machinery in Admiralty possession in 1940 was 225,000 and in 1945 2,200,000—almost 10 times as great; the current figure is 780,000."

Turning to the subject of gas turbines, Sir Denis said: "You will have read in the press about M.G.B.2009, later re-numbered 5559. This gunboat was the first craft in the world to be driven by a gas turbine; the turbine was designed and built by Metropolitan Vickers. It is of simple open cycle type and as such is, of course, only suitable for highspeed boost running as no attempt is made in the design to get economy at low powers. The experience in this craft was remarkably successful and has encouraged the Admiralty to build two new prototype boats powered by large turbines of the same type for operation in conjunction with diesel engines to give economy at lower powers. Further boats will be built under the re-armament program. For other applications where the gas turbine must itself give good economy at low powers the Admiralty have two complex engines of 6,000 hp. under development by Rolls Royce and the English Electric Company respectively.

"For power generation it is hoped that the gas turbine will combine the diesel generator's independence of external systems with the low maintenance required by the steam turbo generator. In this field Messrs. W. H. Allen are developing 1000 kw. and 200 kw. gas turbo alternators for the Royal Navy. The 1000 kw. machine is now under trial and has been very satisfactory up to date. For small craft, where low fuel consumption is not important, the simple gas turbine is attractive and the Admiralty has bought a number of small gas turbines from the Rover Co. for sea trials in a harbor launch. The Admiralty is convinced that there is a great future for gas turbines in the Navy; the advantages expected include a high power/weight and power/space ratio, low maintenance and greater maneuverability, including very rapid starting. There is still a long way to go and many difficulties to overcome, but every effort is being made to keep in the forefront of development."





One section of the 130 Multi-Duty Filters which serve 83 engines and power house ventilation system.

Filtering 5,500,000 cfm!

130 AAF Multi-Duty Filters Serve Engine Room of New Reynolds San Patricio Plant

Imagine a power plant capable of supplying electricity for the combined residences of Ft. Worth, Dallas, Houston and San Antonio! That's the generating capacity of the 83 engines serving Reynolds Metals new aluminum reduction plant at San Patricio, Texas.

This "powerhouse" is made up of 42 Cooper-Bessemer, 3700 hp., 4-cycle, supercharged engines and 41 General Motors, 2850 hp., 2-cycle radial gas engines. Their air intake requirements plus that of the engine room ventilating system total 5,500,000 cfm.

Protecting this multimillion-dollar investment against the ravages of dust and dirt are 130 AAF Multi-Duty Type CMS Filters. These filters, designed for heavy dust loads, clean both the air and themselves *automatically*. It is this continuous, self-cleaning action that assures uniform air delivery and constant high air-cleaning efficiency. And in this installation the Viscosine filter oil is continuously circulated and cleaned to further simplify maintenance.

This installation solves Reynolds air-cleaning problems. Yours may be different. AAF has both engineering experience and a line of filters which, when combined, result in the solution—not just a sale. We'll welcome the opportunity to work with you in cutting costs with clean air.

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Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

An Unusual Repair Job

OFTIMES in making an annual inspection and overhaul job, one is liable to run into something out of the usual, which was the case when we made our annual inspection and overhaul on one of our large slow speed diesel units. For several weeks prior to our removing this unit from the line for this annual inspection, the operators had been having trouble with seepage of jacket water from the joint between the block and liner in both #4 and #5 liners. All the liners had been renewed in this unit in May of 1948 and at the time of renewal we had been forced to use a metallic serrated gasket for this joint, inasmuch as we were unable at the time to get the conventional copper gaskets.

From former experiences with these steel serrated gaskets we were aware that they deteriorated much faster than the copper gaskets, so that when this seepage began to appear as the engine was started up and at shutting down time, we naturally figured that these gaskets had simply deterirated and that on the spring overhaul these two liners would have to be pulled, the joints cleaned and new copper gaskets installed. Since #5 liner seepage was the worst, we pulled that liner first, and lo and behold we found that the liner support ring which made the joint with the liner, had a piece of metal broken out of it, and that the seepage was coming out at the back of this crack. This piece which is shown in Figure 1, was about 6½ inches long 1½ inches wide and tapered down from ⅜ of an inch at the top to zero thickness at the bottom. This figure 1 shows the surface of the broken piece away from the liner side and evidently from the rust deposits on this surface, the seepage had been going on for some time, but not to the extent of where it showed externally.

The question of how to make a repair of such a break arose and several suggestions were made, such as chipping out some of the remaining metal and brazing it full, then grinding and scraping it down to size for a fit with the liner. This was discarded since it was felt that perhaps an electrolytic action might occur between the metal of the block and the brazing material, which would eventually cause a recurrence of the leak. The next proposition and this is more or less of standard practice, was to mill out the block to a depth of approximately 2 inches and ⅝ of an inch wide, and insert a complete tight fitting ring in the top of the block to again form the support for the liner. This would have consumed considerable time and labor and would have necessitated making the proper sized ring to insert after milling out the block, and causing us considerable more outage time than our maintenance schedule had called for. It was finally decided to try and make this repair by metallocking a piece in this ring and the job was done as follows: Figure 2 shows the ring on the block where the piece shown in figure 2 was removed. If you will note carefully in this picture you can see where the mechanic had started to chip out the worn surface with a small chipping hammer. Figure 3 shows the completed slot chipped in the block ring support and ready for the inserted piece to be placed in this slot and metallocked.

The slot was prepared by first roughing it out with a chipping hammer then grinding and filing and finally scraping it to uniform depth and width, it being ¾ of an inch wide, 1¾ inch deep and 6⅝ inch long. When this was completed a piece of metal of the same composition as the block was placed on a milling machine and the inside and outside radius turned, tolerances of approximately 1/32 of an inch oversize being maintained on the width, length and depth of the piece to be inserted. The piece to be inserted was finally filed and scraped down to a very snug fit and before inserting for the final time, both the surfaces of the slot and the back surface of the insert were coated with Copaltite. The piece was then inserted and metallocked into place by the usual metallocking process of lacing in. When this was completed, by use of a large inside mic, the surface next to the liner was ground and scraped to the proper radius. Then by means of a lapping in ring, the upper surface of the ring where the liner rests with the gasket was lapped in until we had a perfect fit. The finished job is shown in Figure 4 and the total elapsed time to complete this job was approximately 15 hours, four hours of which were consumed in getting the final lapped in fit.

Fig. 1, showing the piece broken out of the liner support ring on the block.

Fig. 2, showing the place where the piece was removed.

Fig. 3. View of the support ring in the block readied for the insert.

Fig. 4. The insert metalocked in place as the eventual repair.

When the liner was inserted on a new copper gasket, the unit asembled and the jacket water turned on under operating pressure, there was absolutely no sign of any leak and we had a watertight repair job done in a minimum of time. The liner in #4 block was then pulled and as we had suspected the seepage in this joint was entirely due to a deteriorated metallic gasket. However, after cleaning the surfaces of both block ring and liner we did take the precaution to use the lapping ring and true up the surface of the block ring, so that when the new copper gasket was installed we were sure of a tight fit at this joint.

The conclusion to try this type of repair on this break was brought about by the success which we have had on this method of repairing cylinder heads. Some cylinder heads on these large units, after a few months of operation develop hair line cracks either from strain in pulling the heads down, unseasoned metal in the heads causing undue expansion or contraction which is generally caused by either overheating or too sudden cooling. We have had several cylinder heads with these hair line cracks repaired by the metallock process, and in no instance to date have we experienced a failure with this type of repair. Since this has been our experience we felt that this method of repair on this type of a break would be less expensive, cause us a shorter outage period and in all probability give us just as satisfactory a job as going into a longer period, milling out the support ring and having a special insert made and installed. So far our judgment has been warranted and the unit is operating as well as ever.

You have no power problem when a **Petter Diesel** drives your product!

Petter Diesels from 3 hp to 36 hp are ideal for Compressor Drives, Pumping Units, Road Rollers, Tractors, Stone Crushers, Concrete Mixers, Saw Benches, Refrigeration Machinery, Generator Sets for marine or industrial duty, and virtually every application where a dependable source of economical power is required.

ASSURED AVAILABILITY

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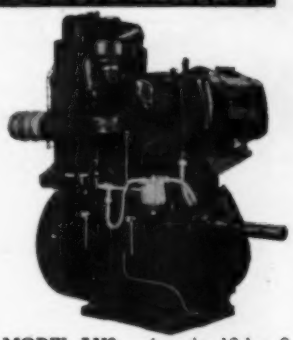
ROCK-BOTTOM PRICES

PETTER *Water-Cooled* DIESELS

Petter water-cooled diesel engines are available in two basic 4-cycle models. Series AV–3 to 12 hp. Series B–12 to 36 hp. Thermo-syphon tank cooling or radiator. Hand or electric starting without difficulty, even under sub-zero conditions. Full-speed drive from either end or half-speed drive from timing-gear end except on B3 and B4 models. Aluminum alloy pistons and removable cast iron liners.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AV1	3/6	1000-1800	3.15	4.33	29.75	17.75	28.5	406
AV2	6/12	1000-1800	3.15	4.33	36.5	17.75	28.5	598
B2	12/18	1000-1500	4.33	4.33	43.5	21	37	939
B3	18/27	1000-1500	4.33	4.33	50.125	21	37	1218
B4	24/36	1000-1500	4.33	4.33	56.75	21	37	1478

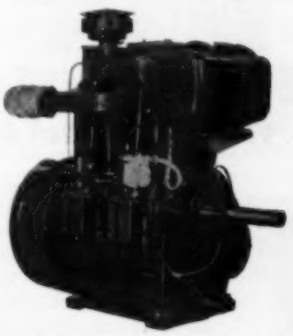


MODEL AV2 — 4-cycle, 12 hp, 2-cylinder, 1800 rpm, vertical, water-cooled industrial diesel engine.

PETTER *Air-Cooled* DIESELS

TYPE AVA–3 to 11 hp in 1 and 2-cylinder models. Air-cooled by flywheel fan and ducting over finned cylinders and cylinder heads. Light weight, low overall dimensions. Hand or electric starting. Full-speed drive from either end, or half-speed drive from timing-gear end. Totally enclosed, but easily accessible. Dependable operation under any climatic conditions. Direct injection with an open combustion chamber insures easy starting.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AVA1	3/5.5	1000-1800	3.15	4.33	29.75	20	29	390
AVA2	6/11	1000-1800	3.15	4.33	37.75	21	32	558



MODEL AVA2—4-cycle, 11 hp, 2-cylinder, 1800 rpm, vertical air-cooled industrial diesel engine.

Throughout the world, in over 100 countries, Petter Engines, parts and service are available. This is an added advantage for you if your equipment is to be sent outside the United States. The Petter factory, one of the most up-to-date and efficient plants in the world, produces 1500 Petter Diesels every week.

Call and see your local distributor or write for additional information.

Distributors:
Only a few choice territories still open. Act fast for this valuable franchise.

PETTER ENGINE DIVISION
of BRUSH ABOE Inc.
EMPIRE STATE BUILDING
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New York 1, N. Y.

Marine Sales Manager

Robert W. Phillips

Robert W. Phillips has been appointed marine sales manager of the Detroit Diesel Engine Division, V. C. Genn, General Sales Manager, has announced. Mr. Phillips, who joined Detroit Diesel in 1950, was formerly with the Maritime Commission where he served as assistant chief construction supervisor on the superliner *United States*. Mr. Phillips takes the post formerly held by W. C. Gould who now heads the Division's Marine Sales Office in New York City. In his new position he will continue in charge of sales to Government agencies.

Electrical Maintenance Service Booklet

A 24-page booklet describing a complete maintenance service for electrical apparatus can be obtained from the Westinghouse Electric Corporation. The booklet presents a sound maintenance program based on the use of genuine renewal parts, repair service plants, and engineering and field service. Dozens of photographs show the special skill, testing devices, and repair equipment which are available to customers through strategically located repair plants. Many improved design renewal parts are illustrated to emphasize the importance of obtaining genuine renewal parts. Motor exchange service, periodic inspection service, and "on the spot" repairs by field engineers are also described. For a copy of this booklet, B-4766, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

Expands Cincinnati Facilities

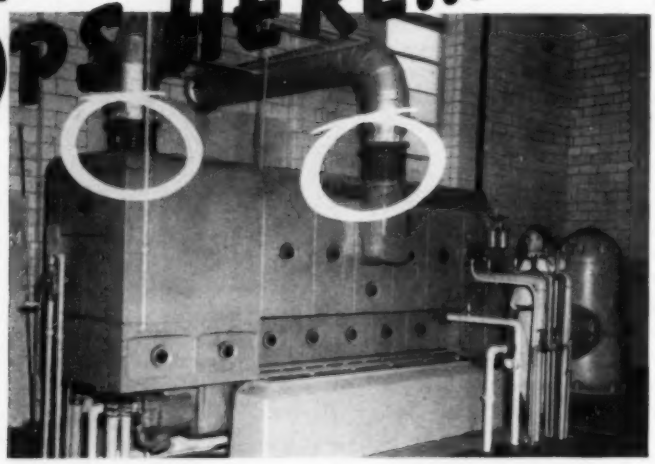
Partial view of Central Ohio Tractor's Parts Department in Cincinnati. Insert is Leo G. Koelker, manager of the new outlet.

Central Ohio Tractor Company, construction equipment distributors of Columbus, Ohio have increased their facilities for the sale and service of General Motors diesel engines in Cincinnati. According to F. Frantz, president of the company, a branch fully equipped for overhauls and carrying a complete stock of parts has been established at Dane and Ellis streets. Leo G. Koelker, diesel sales engineer, who has been operating for the company in the Cincinnati area for the last two years, has been placed in charge of the new outlet. Mr. Koelker is assisted by Charles Eiselein as parts and service manager, Joseph Marketti and James Rackman. Both Mr. Marketti and Mr. Rackham have attended factory service training courses conducted by the Detroit Diesel Engine Division in Detroit. The new branch puts the company within a 60 mile radius of practically all GM Diesel users in the Columbus and Cincinnati areas, Mr. Frantz said. Mr. Koelker's experience with diesel engines dates from 1918 and he has been associated with the sale and service of GM Diesels for the last four years.

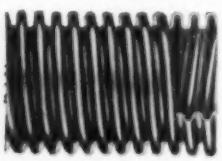
Launched in France

Launched and delivered early this year in France was the *St. Patrice*, a 16,500 tdw. tanker. The vessel was built at Dunkirk by the Atelier et Chantiers de France. It is similar to two sister ships previously built and another currently on the ways. It has an overall length of 541 ft. 10 in., a beam of 70 ft. and a depth to main deck of 38 ft. 5 in. She has a loaded draft of 29 ft. 7 in. and a loaded service speed of 13 knots. Propulsion is through a single acting, two-stroke, 8-cylinder Burmeister & Wain engine.

VIBRATION STOPS HERE...



...when you use CMH REX-WELD Flexible Metal Exhaust Connectors



CMH REX-WELD Flexible Exhaust Connectors are available in sizes from 1" to 24", I.D. Furnished with standard pipe nipples, couplings, fixed or floating flanges. Other types available for such services as fuel, oil, air, and lube lines.

It's easy and economical to keep engine vibration out of rigid exhaust or air intake lines with CMH Flexible Metal Exhaust Connectors. Fabricated from heavy duty corrugated tubing, they not only isolate vibration but absorb expansion and contraction and correct for misalignment as well. Because they are all-metal assemblies, they are leak-tight and require no maintenance. Engineered corrugation design gives the fatigue resistance necessary for long, dependable service. Write today for data sheets.

In the illustration above CMH REX-WELD Connectors, Type RW-75, are used in the exhaust and air intake lines of this Fairbanks-Morse Diesel, one of three installed in the municipal pumping station at Corpus Christi, Texas.

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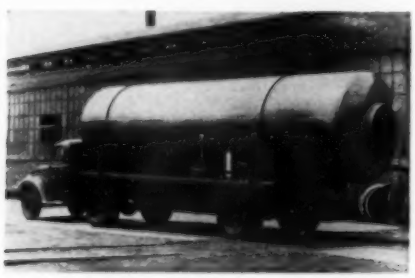
Twin Disc Appointment

Donald E. Beaton

The Twin Disc Clutch Company, Racine, Wisconsin, announces the appointment of Donald E. Beaton as assistant general manager, Hydraulic Division Rockford, Illinois. The new position occupied by Mr. Beaton was created as part of the over all expansion program of Twin Disc, including the current $1,500,000 expansion at the Rockford plant. This, together with improvements and expansions at Racine, plus a considerable increase in working force at both plants, will enable Twin Disc to double its production of hydraulic torque converters, hydraulic couplings, Hydro-Sheave drives, and Hydro-Wynd drives, according to John H. Batten, president. Mr. Beaton assumed responsibility February 1, under the division manager, integrating and coordinating all phases of manufacturing operations at the Rockford plant. Associated since 1936 with Thompson Products, Inc., Cleveland, Ohio, he has been factory manager of Thompson's Accessories Division for the past six years. With a background of precision manufacturing and large scale production, Mr. Beaton has concentrated his experience in the field of hydraulic power transmission mechanisms as produced for the aircraft industry, and in the new techniques which will be used in the manufacture of the new Twin Disc two-stage hydraulic torque converters. In its torque converter line, Twin Disc has up to now specialized in the three-stage type.

Giant and Midget Snubbers



Mutt and Jeff of the "Snubber" world, showing the range of industrial, acoustical devices made by Burgess-Manning Company, Libertyville, Ill., to silence the roar of exhaust from internal combustion engines. Big fellow is an STC-30, weighs 9,000 pounds, has a diameter of 72 inches and is 318 inches long. Little Snubber, standing next to the big brother over the rear wheel of the trailer, is an STC-1, weighs 6 pounds, is 4½ inches in diameter and 22 inches long. These Snubbers are designed to prevent rather than to muffle exhaust noise and to quiet the discharge of blowers and vacuum pumps. They convert high energy slugs to a continuous flow by means of successive snubbing stages to dissipate the energy of the slugs so that the gases reach the atmosphere in a comparatively smooth stream.

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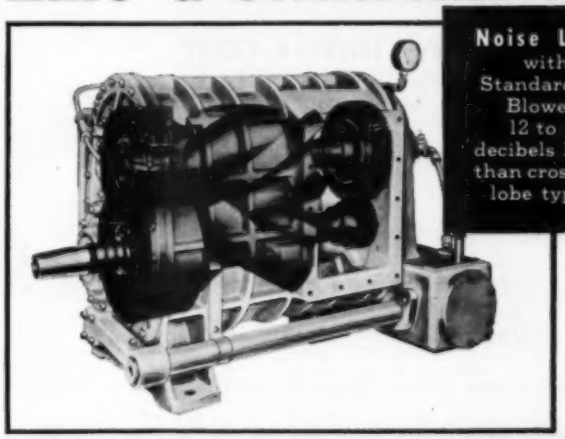

Noise Level with Standardaire Blowers 12 to 18 decibels lower than crossflow lobe types.

STANDARDAIRE QUIETNESS MEANS LESS WEAR--MORE AIR

IMPARTIAL tests have proved conclusively that Standardaire Blowers with their smooth, gradual delivery action minimize shock and sound pulsations . . . a distinct contribution to quiet operation. Then too, the noise level does not noticeably increase with higher pressures. With the Standardaire principle you squeeze the air gently instead of slapping it . . . a feature that eliminates shock load on the internal parts of the blower. This, of course, means less wear and prolongs service life, even under severe operating conditions.

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Personnel Shifted

Aeroquip Corporation, Jackson, Michigan, manufacturer of flexible hose lines and self-sealing couplings, announces the appointment of Robert C. Colyer as manager of Elbeeco, Inc., Aeroquip's wholly owned subsidiary in Jackson. Elbeeco manufactures Aeroquip elbow type hose fittings for the parent company. Mr. Colyer joined Aeroquip in 1949, as a sales engineer, traveling throughout eastern Ohio, and the western sections of New York, and Pennsylvania. For the past year, he has directed Aeroquip's extensive subcontracting and raw materials program. Taking over Mr. Colyer's duties will be A. James Crowley and Don Mortlock, who have been appointed assistant purchasing agents. Mr. Crowley will handle the large subcontracting program, and Mr. Mortlock will take over the important task of procurement of raw materials.

Elected President

The board of directors of Sealed Power Corporation, recently elected Paul C. Johnson as president to succeed his father, the late Charles E. Johnson, who died February 13th. Mr. Johnson has served as executive vice president of the corporation since May, 1948. He started with the company in 1929 and was elected vice president in charge of sales in 1941. The board also elected Lester G. Matthews as vice president and treasurer. He has served as treasurer since 1948. Other officers elected or re-elected are: Raymond R. Beardsley, vice president; Gordon E. Reynolds, secretary and assistant treasurer; Robert J. Mason, Jr., controller and Thomas S. Rose, assistant secretary.

Mr. Mason, as controller, fills a newly created elective office. He has been with the company since 1945 and has filled the position of chief accountant for the past several years. Mr. Rose, who has been credit manager of the Sealed Power Corporation since 1943, was formerly associated with the Oil Well Supply Company, and in his present capacity, Mr. Rose will have charge of credits, service warehouse and insurance.

At the stockholders meeting which preceded the Board of Directors meeting, William R. Munroe, president of the W. J. Brinen Lumber Company, was elected a director to fill the vacancy created by the death of Mr. Charles E. Johnson. Other members of the board, all of whom were re-elected are: Raymond R. Beardsley, Lester G. Matthews, Carl P. Damm, Lou L. Landman, Paul F. Bergmann and Paul C. Johnson. In his report to the stockholders, Mr. Johnson pointed out that Sealed Power's position in the automotive industry was substantially improved in 1951 and that total sales increased 11 per cent. In spite of this increase in sales however, profits after taxes in 1951 were down 33 per cent, compared to 1950. He said that this was due to higher taxes and the fact that increased cost of operation could not be offset by increased prices.

Sales Engineer

Stuart F. Atsatt

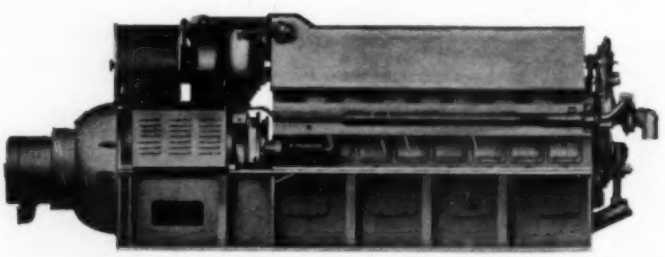
Stuart F. Atsatt, a Stanford graduate in mechanical engineering has been added to the sales engineering staff of Enterprise Engine & Machinery Company. Following service with the Navy as an LST chief engineer (Lieutenant), Mr. Alsatt became a diesel test engineer and for the last four years a diesel project engineer for Enterprise.

STERLING offers you all three!

✓ LOW INITIAL COST
✓ LOW OPERATING COST
✓ LONG LIFE

For fifty years the Sterling Engine Company has been producing high quality light and heavy duty equipment for an ever widening variety of industrial applications.

No matter how diverse the applications, however, Sterling engines have always been characterized by the "Big Three" value that has spelled efficiency and economy to engineers and industrial users for generations.



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J. Gordon Turnbull, Inc.

The engineers and architects for the San Patricio Reduction Plant of the Reynolds Metals Company —J. Gordon Turnbull, Inc.—have built up over the years an enviable reputation for rendering a complete engineering service in all of the diversified fields of industrial, commercial and institutional planning, development and design.

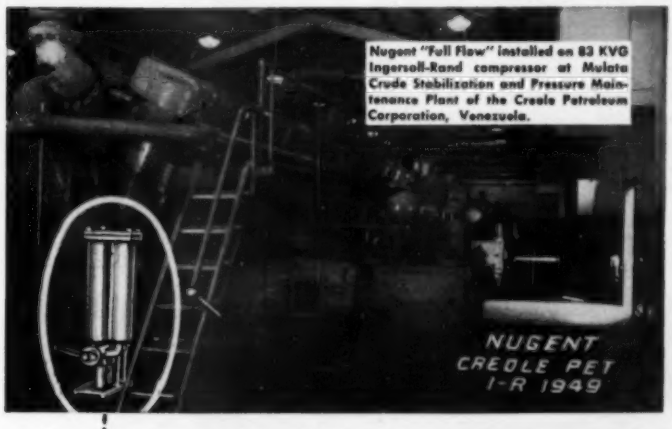
It was no accident that Reynolds Metals Company selected this organization to design and supervise the construction of this huge reduction plant. They had already had experience and efficient operation through the retaining of their services in the design and construction of the twenty-six million dollar Aluminum Extrusion Plant which Reynolds Metals Company operate at Phoenix, Arizona.

The Turnbull organization is headed by J. Gordon Turnbull as President; E. G. Novak, Vice-President; H. V. Wheelock, Vice-President; W. A. Falsgraf, Secretary; and W. D. McArthur, Treasurer. Their principal offices are located in Cleveland, Ohio; Kansas City, Missouri; Dallas, Texas; and Los Angeles, California.

Mr. Turnbull himself has been actively in the engineering and architectural work since 1911. In the period of 1919 through 1934 he was consulting industrial engineer for one of the largest engineering companies in Detroit, handling automotive plant construction almost exclusively. From 1935 to 1939 he devoted himself almost entirely to the three big General Motors plants: (1) Detroit Diesel Plant, (2) Allison Engineering Plant in Indianapolis, and (3) the Electro-Motive plants in LaGrange, Illinois. And then in 1939 he formed the company of J. Gordon Turnbull, Inc., and from that period down to the present day the organization has been responsible for the design and supervision of some of the outstanding industrial plants in this country and abroad. For instance: The U. S. Army Engineers airdromes in the South Sea Islands of the Pacific and Australia, approximate cost $124,000,000; the U. S. Army Engineers Canol Project in Canada, $134,000,000; U. S. Army Engineers Oil Refinery in White Horse in the Yukon, $38,000,000; U. S. Rubber Company Tire Plant at Eau Claire, Wisconsin, $25,000,000; North American Aviation Bomber Plant in Kansas City, Kansas, $41,000,000; Goodyear Tire & Rubber Company Synthetic Rubber Plant at Los Angeles, $12,000,000; General Electric Company Knolls Atomic Power Laboratory at Schenectady, New York, $32,000,000.

Currently the organization is working on a $60,000,000 smelter for Reynolds Metals Company at Arkadelphia, Arkansas; and a $30,000,000 Westinghouse Transformer Plant at Sharon, Pennsylvania. And so the story goes of a strong, well-manned group of designers, architects and technicians operating under the corporate title of J. Gordon Turnbull, Inc.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.


Nugent "Full Flow" installed on 83 KVG Ingersoll-Rand compressor at Mulata Crude Stabilization and Pressure Maintenance Plant of the Creole Petroleum Corporation, Venezuela.
NUGENT
CREOLE PET
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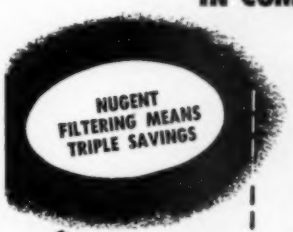
DON'T OVERLOOK THIS CRUCIAL POINT IN COMPRESSOR OPERATION



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IT'S the lube oil filtering system, and it can play a big part in your profit and loss statement.

If you put a Nugent "Full Flow" filter in that spot you can be sure of stopping 99.8% of the harmful impurities that get into lubricating oil before they reach the vital working parts of the compressor. This is the kind of filtering that pays for itself many times over in oil savings, increased equipment life and reduced maintenance.

In Nugent "Full Flow Filtering" all the oil being circulated through your equipment is filtered every cycle. No part of the contaminated oil bypasses the filter. Dirt that is removed from the oil collects inside the special Nugent filter bags. When these bags fill up they can easily be cleaned and reused or new replacement bags are inexpensive. In addition, Nugent filter bags have 20 times more filtering capacity than others of comparable size.

Whatever type of machinery you use — compressors, gas engines or diesels — Nugent Filters can answer your filtering problems. There is a size and type for every need. Write for complete details.

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415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

Established 1897

Overseas Export Corporation

K. S. Thomson, president of Sterling Engine Company, Buffalo, N. Y., has announced the appointment of Overseas Export Corporation, 250 West 57th Street, New York City, as their exclusive foreign sales representative. In confirming this appointment, Mr. Frederick R. Pinter, president of Overseas Export, pointed out that for many years Sterling engines have seen service in most countries of the world and in a wide range of applications both marine and industrial. Sterling's present foreign sales organization comprises 23 distributors. Franchises will be granted in a number of other areas. All distributors will now have the added sales-engineering advantages offered by Mr. Pinter's organization through their New York and London offices.

A well known foreign trade executive and recognized for his engineering abilities, Mr. Pinter is also a member of the Administration Committee of the Foreign Credit Interchange Bureau and Chairman of the Export Committee of the International Trade Section, New York Board of Trade. Sterling Engine Company, founded in 1902, manufactures gasoline, gas and diesel engines ranging to 1,500 horsepower. Mr. Thomson reports sales and profits far ahead of recent years and employment at a new high—brought about principally through the growing demand for their 6 and 8 cylinder Viking Diesel engines.

Promoted to Vice-President

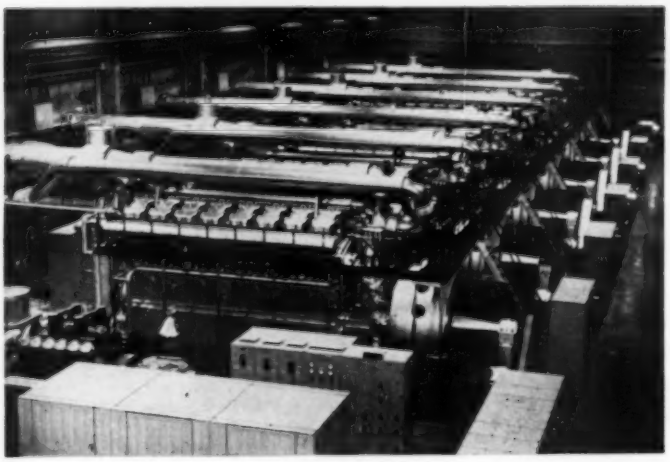
J. T. Calnon

Promotion of J. T. Calnon from sales manager to vice-president—sales was announced recently by J. E. Everroad, president of Cummins Sales & Service, Inc. Mr. Calnon's sales and service experience include work as district service manager at Houston and Wichita Falls, division service manager in Odessa, and sales manager in Fort Worth. He will be in charge of Cummins engine sales throughout the company's area of operations. A native of Nebraska, Mr. Calnon attended school at Grand Island. During World War II he served in the South Pacific on the *USS Whitney* as chief petty officer in charge of diesel maintenance. Shore duty included time as an instructor at the Navy diesel school at Gulfport, Mississippi. Before coming to work for Cummins Sales & Service, Inc., Mr. Calnon was employed in the automobile industry.

Record Sales

New all-time records in both sales and earnings for Purolator Products, Inc., Rahway, N. J., manufacturers of automotive oil filters and other filtration equipment, were shown in the annual report to stockholders by William V. Griffin, chairman of the board, and Ralph R. Layte, president. Consolidated net income for 1951 totaled $1,595,051 or $3.86 a share on 412,742 shares after $3,164,582 for U. S. and Canadian income taxes. Sales were $25,878,776. This compares with net income of $1,250,862 or $3.33 a share on 375,359 shares for 1950, when sales totalled $16,281,956. The wholly-owned subsidiary, Purolator Products (Canada) Limited, reported 1951 net earnings of $104,833 on sales of $1,292,015 as compared with earnings of $38,449 on sales of $843,477 in 1950.

The Company's expanded operations during the year increased its total employment to 1,635 in the two plants at Rahway, N. J., and Ringtown, Pa. Benefits to employees, in group insurance, pension plan, and holiday and vacation salaries and wages totalled $424,573. The report showed net working capital of $4,783,379 for the parent company, as compared with $3,373,386 at the end of 1950. Cash totalled $1,351,498 as compared with $722,386 at the close of the previous year. Stockholders' investment (surplus) rose nearly $1,000,000, from $4,333,163 to $5,332,356. Total assets increased to $11,491,277 from $7,778,536 at the end of 1950.



View in the new Reynolds Metals, Corpus Christi Plant—showing six of the forty-three Cooper-Bessemer LSV-16, 3700 hp. gas engines—all fitted with Ellwood City crankshafts.

ELLWOOD CITY CRANKSHAFTS FOR REYNOLDS METALS PLANT

SINCE 1910 we have supplied high grade finished *and* rough-turned crankshafts and forgings for diesel and gas engines. The selection of Ellwood City crankshafts for the forty-three Cooper-Bessemer, V-type gas engines in the vitally important Reynolds aluminum reduction plant at Corpus Christi testifies to the confidence placed in our products—confidence based on many years of use and experience.

Consult Us On Your Forging Requirements

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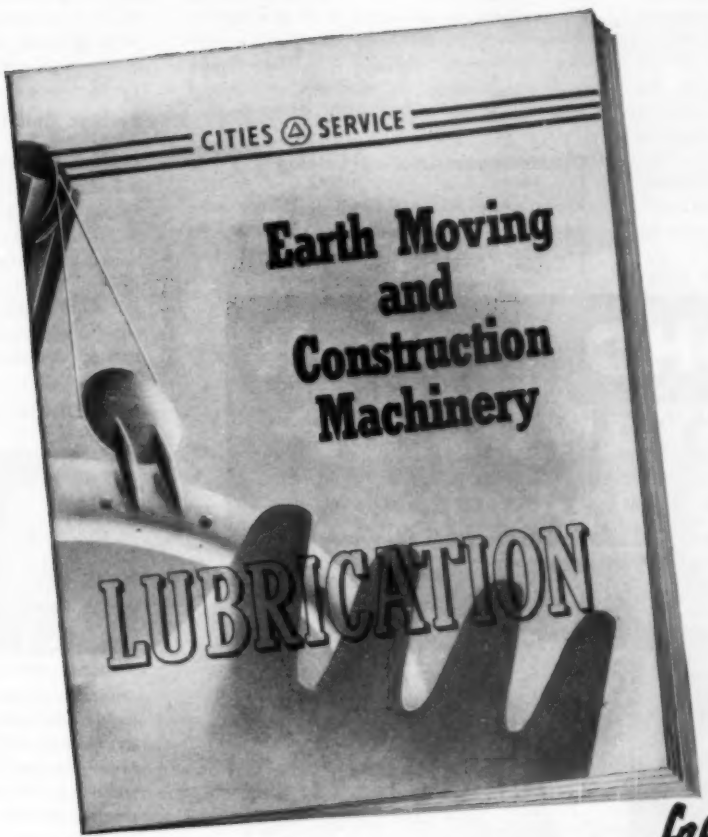

Have you received your 1952 free edition?

FOR YEARS, men in construction and allied fields have found this lubrication book tremendously helpful. It not only discusses the basic fundamentals of lubrication, but it gets right down to specific lubricating techniques for all your equipment.

Proper use of the practices outlined in this book, plus the full line of Cities Service Quality Lubricants can:

- **Lengthen the life of your equipment.**
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- **Speed up operation.**
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If you're the boss and owner, it protects your investment, increases profits and simplifies your operations. If you're working for the boss, proper use of this book will help you on the job. Write now for your 1952 edition of EARTH MOVING AND CONSTRUCTION MACHINERY LUBRICATION, CITIES SERVICE OIL COMPANY, DEPT. G 13, Sixty Wall Tower, New York City 5.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

New Department Manager

Leigh S. McCaslin, Jr., has been named advertising and sales promotion manager of Deep Rock Oil Corp. in an announcement by W. J. Fuchs, merchandising manager. The new department manager joined Deep Rock in July of 1951 as advertising assistant. Prior to that time he was associated with an oil industry trade paper for four years as district editor. Mr. McCaslin is a graduate of Oklahoma A. and M. College and has a bachelor of science and professional degrees from that institution. During World War II he served 44 months with the U. S. Corps of Engineers, including 2 years in the Pacific theater, and was a major upon discharge in 1946.

Assistant Sales Promotion Manager

D. E. Schwendemann has been appointed sales promotion manager of the Detroit Diesel Engine Division of General Motors, V. C. Genn, general sales manager, has announced. In his new capacity Schwendemann, who joined Detroit Diesel in 1946 as a sales engineer, will assist R. L. Burpee, sales promotion manager, in expanded promotional activities.

Dynamometer Cooling Catalog

Three Young Radiator Company heat transfer products, used in Dynamometer Cooling, are described in Young's new Catalog No. 6051. This piece includes illustrations and specifications for Young Jacket Water Coolers, "Mono-Weld" Radiators, and Heat Exchangers together with a typical dynamometer cooling installation diagram. Emphasis is placed on the engineering of these products to accomplish balanced closed-system cooling. Write to Young Radiator Company, Racine, Wisconsin, requesting catalog No. 6051.

Pyrotac Bulletin

An eight page folder describing the Alnor Pyrotac Automatic Protection system is available from the Illinois Testing Laboratories, Inc., 420 No. LaSalle St., Chicago 10, Illinois. The folder details the rugged construction and protective features of the Pyrotac. It lists the numerous applications where this continuous "watchman" over valuable equipment can prevent serious damage where excess heat can cause a shutdown of equipment.

New District Manager

T. J. Angel

Transfer of Mr. Ted J. Angel, Nordberg sales engineer from Milwaukee, to the company's St. Louis, Missouri office has been announced by R. W. Bayerlein, vice president, Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. At his new post, Mr. Angel will assume the position of district manager of the company's central territory. Mr. Angel was born in Minneapolis, Minnesota, and following his formal education he enrolled in Marquette University's School of Engineering. In 1937, while attending Marquette, he began his association with Nordberg as a co-op student assigned to test and erection engineering. Following his graduation from Marquette in 1940 as a mechanical engineer, he was transferred to the engineering department for test calculation and general design work.

Mr. Angel took a leave of absence in 1943 and entered the United States Navy where he served as staff flotilla engineer and repair officer aboard diesel powered vessels. He was discharged from the Navy in 1945 with the rank of Lieutenant and returned to Nordberg as an application engineer handling the purchasing, designing and layout of auxiliary equipment for diesel installations. A short time later he was named sales engineer and special representative assigned to the midwestern territory of the Heavy Machinery Division with headquarters in Nordberg's Milwaukee plant. He retained this position until his recent appointment as district manager, Central Territory. Mr. Angel is a member of the American Association of Mechanical Engineers and the American Association of Naval Engineers.

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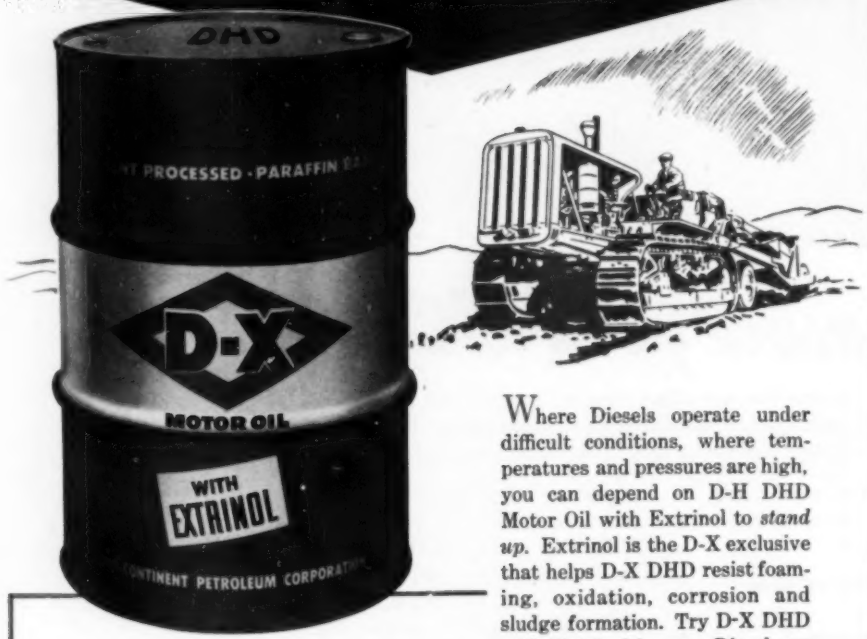
D-X DHD MOTOR OIL STANDS UP *UNDER PRESSURE!*



Where Diesels operate under difficult conditions, where temperatures and pressures are high, you can depend on D-H DHD Motor Oil with Extrinol to *stand up.* Extrinol is the D-X exclusive that helps D-X DHD resist foaming, oxidation, corrosion and sludge formation. Try D-X DHD with Extrinol in your Diesels on a money-back guarantee of better performance.

FREE—D-X INDUSTRIAL LUBRICATION ENGINEERING SERVICE

The D-X line of industrial lubricants includes a product for every industrial need. If you are located in the Middle West, a D-X Lubricating Engineer will be glad to help you with your problems. Ask for his services. You will not be obligated in any way.

D-X

MID-CONTINENT PETROLEUM CORPORATION

TULSA, OKLA.

Waterloo, Ia. Terre Haute, Ind. Omaha, Nebr. Chicago, Ill. Minneapolis, Minn.

Locomotives on Order

Fairbanks, Morse & Co. has received an order for 6 heavy-duty, 2000 horsepower, diesel electric locomotives from the Pittsburgh and West Virginia Railway Company, according to Robert H. Morse, Jr., president. Total cost is in excess of $1,000,000. When delivered, the railroad will have 22 of these heavy-duty Fairbanks-Morse locomotives and will be completely dieselized. All of them are so equipped they can be operated as 2 unit, 4000 horsepower, engines. They will be manufactured at the Beloit, Wis., Works and delivery is to be made as soon as possible, according to Mr. Morse.

New Publication

A four-page booklet has been issued by Commercial Filters Corporation. This booklet gives thumb nail descriptions of standard models of Fulflo filters for microscopic clarification of industrial liquids and gases and provides details of the Honeycomb filter tubes. It also gives essential data on single and multi-tube filters of capacities from 6 to 60,000 gph.; steel, brass, rubber lined steel and stainless steel models, and special applications. The Commercial Filters Corporation is located at Boston and Melrose, Mass.

Completes Diesel Courses

The Detroit Diesel Engine Division of General Motors recently completed a four month series of courses in diesel engine operation and maintenance on the Mesabi Iron Range in northern Minnesota. Over 250 equipment supervisors and mechanics representing 30 mining companies attended the one week courses which started January 7. The school was given by one of General Motors nine mobile training units which are currently operating in distributor and on-the-job locations throughout the United States, Canada and Mexico.

Buda Issues Catalog Folders

The Buda Company of Harvey, Illinois has issued three attractive, two-color catalog folders describing their "FT Series" fork lift trucks. Fully illustrated and carrying complete specifications on the fork lifts, they are available on request to the company. Bulletin No. 1579 describes the 3000 pound capacity gasoline and diesel units. Bulletins No. 1580 and No. 1581 describe the 4000 pound capacity unit with an 18-inch load center and the 4000 pound capacity unit with a load center of 24-inches, respectively. All three units come with diesel or gasoline engines.

For DEPENDABILITY
THE CORRECT FASTENER FOR THE JOB!
Precision and Quality Workmanship, backed up by 38 years of Erie experience, are yours for thoughtful buying. Whether you require a fastener made from carbon, alloy or stainless steels, to special design, to exacting specifications, Erie fasteners will save you time and expense . . . from your planning, to procurement, to fabrication. Submit your fastener requirements to us, Erie Service will meet the challenge.
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STUDS • BOLTS • NUTS
ALLOYS • STAINLESS
CARBON • BRONZE
Representatives in Principal Cities.

Bulletin Issued

Torcon Corporation of Ashtabula, Ohio has issued a colorful bulletin describing their heavy-duty hydraulic torque converter. The unit is designed for standard SAE mounting. Installation merely requires bolting the unit to engine flywheel housing and connecting two lines to the oil cooler. The Torcon torque converter is furnished with or without cut-off clutches. Widely applied on such equipment as rail cars, oil well rigs, road machinery tractors, shovels and mining equipment, the manufacturer emphasizes its versatility, compact design and utilization of maximum horsepower. For copies of this interesting Bulletin TC-639 write the Engineering Department, Torcon Corporation, Ashtabula, Ohio. Additional technical data, engineering specifications and installation diagrams supplied on request.

Distributor Appointed

The Wix Cooler Compay of Seattle has announced the appointment of the Fremont Electric Company, of the same city, as distributors for Wix Cooler products in the Territory of Alaska. Fremont Electric Company received the appointment only recently but are already laying the groundwork in the Territory. Don Brastow, Fremont's Alaska salesman left for Alaska May 18 to contact and acquaint Fremont's Marine Dealers with the new line. The Wix Cooler Company, although a comparatively young company, has already obtained wide distribution throughout the United States. They manufacture heat exchangers and Galley Maids for marine installation. It is expected that Alaska, with its gigantic fishing industry, will prove a fertile field for sales of these marine products.

Briggs OIL CLARIFIERS ON STATIONARY-TRANSPORT-MARINE DIESELS PAY OFF BIG...

...because they keep lube and fuel oils clean--physically and chemically!

11 YEARS AGO, the Rural Cooperative Power Association of Minnesota started using Briggs clarifiers. Now ten, including 3600 H.P. diesel engines in their five operating plants, are Briggs-equipped.

Satisfaction like this proves Briggs' performance is superior. Operating men specify Briggs wherever diesel engines are used. These men know that over the years Briggs keeps lube and fuel oils clean—physically and chemically—keeps engines running better, longer.

Let us run a check on your present filtered oil—send a sample and full engine data. We will put it through our laboratory and give you the report. If new filters are needed, we will recommend type and size.

Briggs Has The Right Filter!

★ A Briggs catalog belongs in your file—write for one TODAY!

Briggs PIONEERS IN MODERN OIL FILTRATION

THE BRIGGS FILTRATION COMPANY
RIVER ROAD, WASHINGTON 16, D. C.

FOR MORE THAN A QUARTER CENTURY

Elected to Board of Directors

L. W. Beck

D. J. Cummins

W. M. Harrison

Three additional members were elected to the Board of Directors of Cummins Engine Company, Inc., at the annual meeting of the shareholders, held at Columbus, Indiana, on April 1. They are: L. W. Beck, vice president—sales, D. J. Cummins, vice president—engineering, and W. M. Harrison, vice president and treasurer. Mr. Beck joined the Company in 1939 as manager of Cummins Diesel Sales Corporation of Illinois, the Chicago dealership. For many years previous he had been with Euclid Road Machinery Company, Cleveland, first as general service manager and later as west coast representative. In addition he had been manager of truck sales, northeastern division, for Reo Motor Co., Lansing, Michigan, and at one time had been in the trucking business with his father at Euclid, Ohio.

In 1940, Mr. Beck was named regional manager of the Cummins central region, with headquarters at Chicago. He held this post until 1946, when he became general sales manager for the company. In April, 1948, he was named vice president—sales.

Mr. Cummins has been with the Company since its formation in 1919. He served in various capacities until 1943, when he was made manager of the research laboratory. In 1946, he became manager of quality control and in 1947 he held the position of manager of engineering and quality control. In April, 1948, he was promoted to vice president—engineering. During the early years of the Company, Mr. Cummins helped in the development of the highspeed, lightweight Cummins diesel. Since 1943, he has directed all the new engine development activities of the Company, including the first multiple cylinder diesel engines known to have operated at a speed of 4,000 revolutions per minute.

A native of Muskogee, Oklahoma, Mr. Harrison is a 1929 electrical engineering graduate of the University of Cincinnati. He spent 12 years with the Pennsylvania Power and Electric Company, Allentown, Pennsylvania, doing industrial sales work. He also was with Atlas Powder Company,

Wilmington, Delaware, as an electrical engineer for 1½ years. In 1943, Mr. Harrison joined the Cummins organization as assistant to sales manager; in 1944, he became materials manager; in 1946 he was named materials manager and assistant manager and assistant controller; in 1947 he advanced to the position of controller; and in the same year he was appointed treasurer and controller. He was named vice president and treasurer in 1948. At the same meeting, the following directors were re-elected: Clessie L. Cummins, honorary chairman; Irwin Miller, chairman; E. G. Crouch, C. R. Fox, R. E. Huthsteiner, Hans L. Knudsen, V. E. McMullen, Mrs. Nettie S. Miller, and David B. Stern.

Joins Enterprise

Dennis J. O'Leary

Dennis J. O'Leary, following several years of diesel field work in the Middle West with Cooper-Bessemer, becomes a sales engineer for Enterprise Engine & Machinery Company, with offices in San Francisco. Mr. O'Leary is a graduate mechanical engineer, which combined with his fine field background, makes him an asset to the growing diesel industry.

New Book Published

"Fuels and Combustion," a new book by Marion L. Smith, assistant professor of mechanical engineering, and Karl W. Stinson, professor of mechanical engineering, both of the Ohio State University. McGraw-Hill. $6.50.

The volume provides fundamental and factual information on solid, liquid and gaseous fuels and the problems associated with their combustion. The authors have included the general topics of fuel technology and the relation of air, fuel, combustion products and the heat released. This discussion helps the student to understand clearly the problems involved in the application of combustion to furnaces, heaters, oil and gas burners, reciprocating internal-combustion engines, gas turbines and rockets. Basic concepts of modern theories of oxidation are presented in such a way that they will be understandable. This is the first work of its kind to include all the following material in the same terminology: technology of solid, liquid and gaseous fuels; fundamentals of combustion; applications of combustion of these fuels to furnaces, heaters, internal combustion engines and gas turbines.

Chapter headings are: 1. Fuels, 2. Stoichiometric Analysis, 3. Thermochemical Analysis, 4. The Process of Combustion, 5. Physical Properties of Fuels, 6. Gas and Oil Burners, 7. Coal-Burning Equipment, 8. Combustion in Engines.

This volume is an excellent addition to the engineer's reference shelf. Copies are available from DIESEL PROGRESS. Mail checks for $6.50 to DIESEL PROGRESS, File 100, 816 N. La Cienega Blvd., Los Angeles 46, California and "Fuels and Combustion" will be sent postpaid.

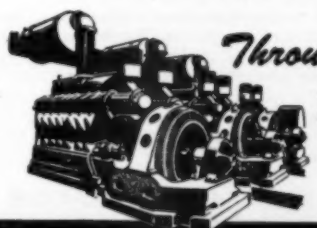
Heating?
Cooling?
Air Conditioning?
Process?

Here's How to
Get the **RIGHT** Answer to your
HEAT-EXCHANGE PROBLEMS

The right ratio of surfaces—the right materials—the right velocities—the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

For best performance in your own application, the practical approach is to take full advantage of the unequalled engineering, research and design skill — the unequalled manufacturing and testing facilities — which Aerofin offers you.

To get the *right* answer—ask the Aerofin man.



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Aerofin units do the job Better, Faster, Cheaper

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Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

Inland River Reports

By DAVID I. DAY

THE *Frank B. Durant* of the Oil Transport Co., New Orleans, for quite a while a "fixture" on the upper Ohio is reported lately at work in home territory, towing from North Pass at the mouth of the Mississippi up to Baton Rouge, La. She was built two years ago at the Alexander Shipyards, New Orleans and is powered by twin General Motors engines, totaling 2400 hp.

WE OBSERVED the *City of Maysville*, a towboat now owned by interests in Maysville, Ky. Now, over a period of 30 years we have seen this boat under five different names. As a steamer of the U. S. Engineers she was called the *Tallulah*. Ten years ago she was converted to diesel and called the *Walter F. Carey*. In succession she has now been the *Commercial Dixie*, the *Commercial Tennesseean*, and now the *City of Maysville*. She has twin Superior diesels totaling about 800 hp.

A COLLAPSE of the old Muskingum River dam at Zanesville, O., made front page Ohio news. At one time this area was noted as a boating center but now only the Muskingum River Gravel Co., runs boats. It has three diesel boats, the 100 hp. boat *Marguerite* with Fairbanks-Morse engine, a very similar Fairbanks-Morse boat called the *Gravel King* and the 100 hp. *Dawn* with an International engine.

THE BIGGEST TOW of slag we have seen on the Ohio lately was last week, 12 heavy barges in charge of the *A. V. Criss, Jr.*, of the Atlas Towing Company at Parkersburg, West Virginia. This boat was at one time the *Kansas City Socony*. She has twin Superiors totaling about 1000 hp.

ANOTHER NAME change noted at Louisville. The *J. L. Beatty* is now the *Martha E. Greene*, owned and operated by the R. W. Greene Sand & Gravel Co., at this city. The boat has a pair of Winton diesel engines with diesel-electric drive. She is rated 450 hp.

THE RECENT HIGH water on the upper Mississippi completely demoralized traffic for a time but all is back to normal. It was interesting to note the *Laguna* of the Paralind Oil Company fleet running down river, about the last boat to make it and she was also the first boat we saw pushing a tow up river when conditions improved. The *Laguna* is a truly fine boat, 116 x 27.5 x 10. She was built by the Nashville Bridge Co., back some three years ago, has General Motors twins with 1800 hp.

ST. LOUIS SHIPYARDS are extremely busy. Three new diesel towboats for Jones & Laughlin at Pittsburgh mean another step of the big steel corporation from steamboats to diesel vessels. The three will be 1400 hp. with Superior engines and all latest equipment. J. K. Davison & Bro., of Pittsburgh, another big-time steamboat owner, has a boat being built at St. Louis, with twin Caterpillars totaling 800 hp. The new 500 hp. Fairbanks-Morse engined boat to be named the *Louise* is nearing completion for the Crounse Corporation at Paducah.

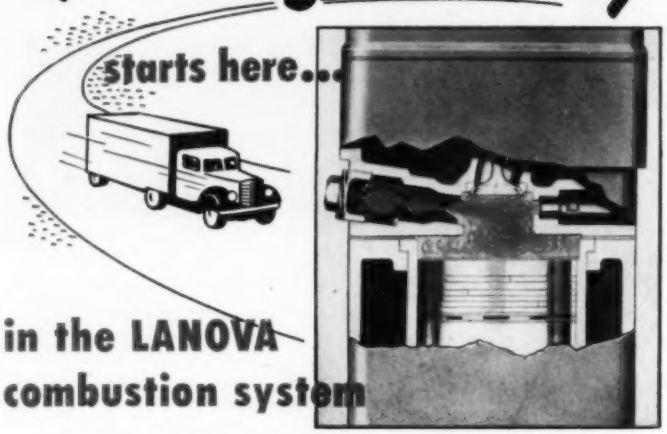
O. F. SHEARER & SONS, Winchester, Ky., big coal transporters and owners of many steamers in times past and present is on its way to diesels. It has some fine ones already and now buys the *Patriot* from the American Barge Line. This boat has twin Cooper-Bessemers totaling 2000 hp.

NICE COMPLIMENTS are coming in on the *Irving Crown*, the newest diesel vessel now towing on the busy Illinois. It belong to the Material Service Corporation, Chicago, Ill., was built by the Sturgeon Bay Shipyards, Sturgeon Bay, Wis., and uses twin Nordberg engines.

JAY McCOOL, returning from a trip down the canal to Houston, has a nice picture of the tug *Coral* of the A. G. Middleton & Sons fleet. It is now towing for the Alamo Barge Lines. At one time, the tug operated in and around Philadelphia. It is powered with a General Motors engine. It has about 900 hp. The picture was snapped at the Freeport, Texas, floodgates.

THE *Neville* has been an extremely active boat for Union Barge Line. Built at Dravo in 1935 it is running like a new one with twin General Motors totaling around 1500 hp. She was seen recently

Operating Economy



If you're looking for a way to save money on fuel bills, check into the economies offered by Diesels that use the Lanova Combustion System.

The Lanova System is designed to utilize the maximum amount of the fuel's energy in the production of useful power. It does this, first, by setting up a violent turbulence in the cylinder which thoroughly mixes the fuel with the air needed to support combustion, Then it times and controls combustion pressures so that they are applied over a longer period of the power stroke. The result — greater operating economy — more profitable power production.

MOST LEADING MAKES of Diesels use the Lanova Combustion chamber principle. But be sure of getting what you want — always look for the distinctive Lanova energy cell design.

Lanova

LANOVA CORPORATION
38-17 30th Street
Long Island City 1, N.Y.

ONE OF AMERICA'S FOREMOST NAMES IN DIESEL RESEARCH AND DEVELOPMENT

with long barges of contractors' machinery of all sorts.

EVIDENTLY THE steel industry troubles have not reached the rivers as yet. We were impressed in May with the number of tows of steel coming down the Ohio. One of the neatest looking was one of 16 barges and two empties in charge of the *L. Wade Childress* of the Mississippi Valley Barge Line. This is a boat with a General Motors engine room from a wartime LSM, 3000 hp.

WE HAVE News that the tug *Clarence H. Brown*, 900 hp., General Motors single screw of the W. B. and M. Company, Houston, is towing for Parker Bros., up the Intracoastal Canal as far as Lake Charles, La. This tug has been giving fine service.

Redesignates Plant

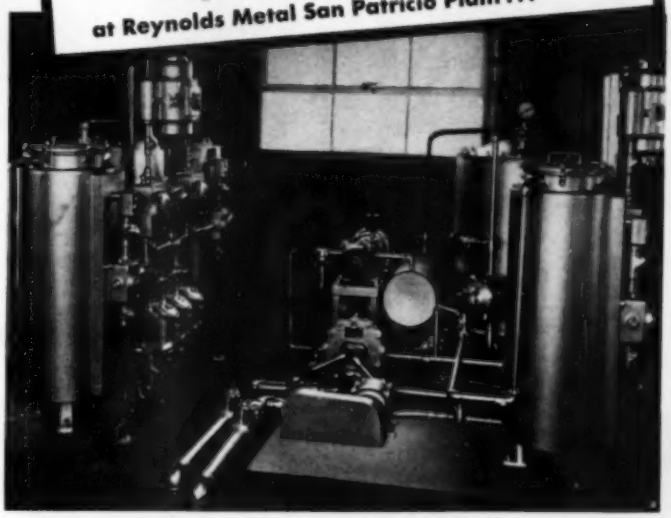
What has been known as the Dunellen, N. J. plant of Worthington Corporation has been redesignated as the Plainfield Works according to F. J. Whelan, sales vice president. Though known as the Dunellen Works since 1943 when purchased from Ransome Machinery Corporation, the plant is not actually located in the town of Dunellen. It is located partly in Plainfield, N. J. and partly in Piscataway Township which is between Plainfield and Dunellen. To provide proper designation the name and address of this plant, effective immediately, will be Worthington Corporation, Plainfield Works, Plainfield, New Jersey. This plant employs some 400 people.

Chief Project Engineer

James A. Hall has been appointed to the newly created position of chief project engineer at Detroit Diesel Engine Division, L. S. Sheldrick, director of engineering, has announced. Mr. Hall, who joined Detroit Diesel in 1940 as an experimental engineer, was formerly engineer in charge of Series 110 engine development. In his new capacity Mr. Hall will have jurisdiction over the engineering laboratory, the engineering model shop and the project engineering staff. His previous assignment will be filled by his former assistant, E. A. Chapin who joined Detroit Diesel in 1938.

it's "Vaporizers by HOFFMAN"

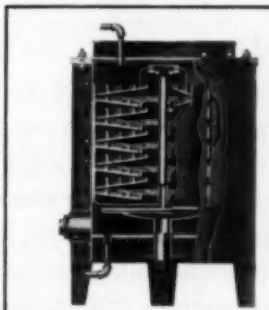
at Reynolds Metal San Patricio Plant...



for CONTINUOUS BY-PASS DEHYDRATION OF LUBE OILS

All 42 of the Cooper-Bessemer Diesel Engines installed at Reynolds' new giant plant for power generation are protected by Hoffman vaporizers on the lube oil system. Dehydration, degasification and fuel dilution removal are continuously performed on the oil by three Model I-24-10 units operating on a by-pass basis at a flow rate of 250-300 gph.

Unique design and operation of the Hoffman vaporizer, utilizing low temperature in high vacuum, completely evaporate all fuel dilution and water from filtered oil by flowing it over a series of electrically heated trays. High flow is accomplished in compact unit with minimum entrainment. Only two moving parts. Get full details for your installation — write for Bulletin A-840 today..



Hoffman vaporizers flow a thin film of oil by gravity over a vertical tier of heated trays. Complete dehydration, degasification and fuel dilution removal are accomplished.

NEW! HOFFMAN FloMASTER FULL-FLOW CARTRIDGE FILTER

See it at BUFFALO A.S.M.E. OIL & GAS POWER Conference and Exhibit HOTEL STATLER, JUNE 23-27 Our Booths #36 and 37

An entirely new lube oil filter that combines top flow rates with minimum initial pressure loss. Greater dirt-holding capacity (down to 20 microns) for maximum bearing protection. See it!

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Correction, Please

In a recent description in DIESEL PROGRESS of "Cotospray" cooling towers, manufactured by J. F. Pritchard & Company, 908 Grand Ave., Kansas City, Missouri, we stated that the "louvers are 1-in. surface hardwood." This is incorrect. Hardwood is never used in the construction of cooling towers. The item should have read that the louvers are 1-in. surface redwood.

Line Surge Correction by Use of Snubbers

Elimination of costly pulsations and accompanying noise in gas engine driven compressor piping at a major Southwest gas processing plant by means of gas and air line snubbers, has been reported by the Burgess-Manning Company in a survey and analysis of the problem. The vibration and noise, which resulted in line breakage requiring constant maintenance, was due to gas line surge from four compressors. Operator fatigue also was reported. The snubbers initially installed on two of the compressors, eliminated these problems, it was reported.

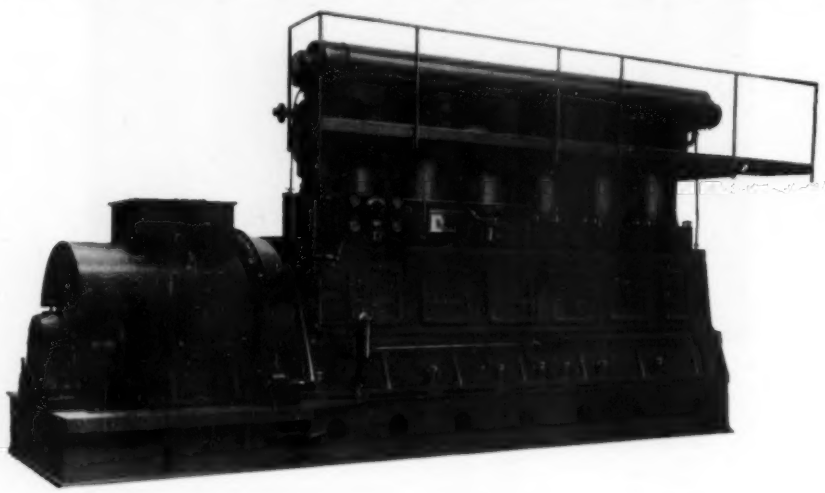
Using electronic equipment, including pressure pickup (transducer) amplifier and oscilloscope, Burgess-Manning engineers determined the value of surge, then installed snubbers in the two pipe systems that were causing the most trouble. After the installation, oscilloscope readings showed that in one line maximum peak pressure had been reduced from 10 per cent of line pressure to less than one per cent in pressures of 300 lbs. and from 11.3 per cent to 2¼ per cent at pressures of 1600 lbs.

It was explained that in analysis the pressure transducer, which was coupled as close as possible to the gas stream, generates a voltage for a given pressure change, and faithfully reproduces in voltage the pressure changes in the pipe. This voltage is conducted to a three-stage amplifier and thence to the oscilloscope screen where photographic records of the surge are taken. Surge amplitude is measured on a screen and calibrated voltage is developed to effect an equal amplitude deflection. The maximum peak pressure change is then calculated from the known data. The section of the plant which was experiencing trouble included the four compressors each having four stages of compression. The first three stages had one double acting cylinder per stage per machine and one single acting cylinder in the fourth stage. Operating speeds varied between 250 and 300 rpm.

Interstage piping from each compressor was independent of the other machines. There was a common first stage suction header for the four compressors and a fourth stage discharge header downstream of the after coolers. Each compressor had individual intercooling and aftercooling arrangements, and piping of each machine was similar. Burgess-Manning engineers analyzed the problem as pulsation resulting in excessive vibration and noise in the discharge piping from several of the stages. After the electronic pulsation survey and tests and the snubber installations on the two stages indicating maximum difficulty, elimination of the vibration and noise as an operating problem was reported.

Elect Board Chairman

Jackson Burgess, of Glencoe, Ill., has been elected chairman of the board of the Burgess-Manning Company, by the directors of the company, it was announced recently. Board chairman is a newly created office for the company. Willis L. Manning, of Libertyville, president and treasurer of the company, which manufactures industrial silencing equipment, with divisions in Libertyville, Dallas, Texas, and Chicago, was re-elected by the directors. The following also were elected: vice-president R. L. Leadbetter, Dallas, Texas; Dudley W. Day, Chicago; C. P. Certik, Libertyville; secretary and assistant treasurer, E. D. Woisard, Libertyville, and assistant secretary, A. W. Dreffein, Libertyville. Mr. Burgess and the other officers were elected following the annual shareholders meeting. These directors, in addition to Mr. Burgess and Mr. Manning, were elected at the shareholders meeting: H. H. Darbo, Chicago; Benjamin S. Reynolds, Madison, Wisconsin, and J. Dean Vail, Jr., Chicago.



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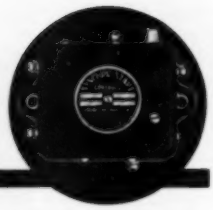
Automatic
CRANKING CONTROLS



The Synchro-Start K Series provide interrupted and time limit cranking. They are small, inexpensive controls for automatic starting from any remote pilot switch.

Models available are, KI for small diesel engines and KIR for magneto ignition engines.

The KI and KIR units are provided with a connection terminal for a failure signal should it be desired.

For further information write for Bulletin 405

SYNCHRO-START PRODUCTS, INC.
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The purpose of this little advertisement is to tell you about Volume 17 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 17th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him *all* data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Advance orders are now being accepted for the limited edition. Price $10.00 prepaid.

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ORIGINATOR OF **MICRONIC** FILTRATION

the *Finest*
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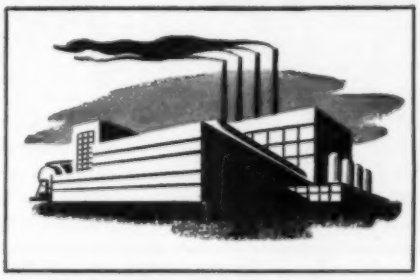

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SHOEING CRAWLER TRACTORS

By E. A. BAKER*

IT'S mighty important to adapt the track shoe size of your crawler tractor to the job conditions. In other words, don't "overshoe" your tractor. Track shoes that are too wide for the kind of work or for the job conditions cut down the track life, maneuverability, and speed of your crawler. When the track shoes are too big, your crawler literally "drags its feet" on the job. All crawler tractors are pretty much alike, model for model, as far as ground pressure with the same width shoe is concerned, so the make of your crawler will have little effect on what size track shoes you use. The all-important factors are the job conditions.

No power loss on turns. This tractor is "wearing" recommended-width track shoes and doesn't use up extra drawbar hp. on turning effort. Oversize shoes make for more work for crawler on turns.

Selecting track shoes for a wide range of operating conditions involves three main factors which must be considered. They are (1) flotation, (2) pull-bracing grouser area, and (3) track-wear life. "Ground pressure" is usually the measure of flotation. An easy way to determine ground pressure is by dividing the tractor's weight in pounds by the number of square inches of track area resting on the ground. You figure the track area on the ground by doubling the track shoe width and multiplying that figure by the distance in inches between the center lines of the drive sprocket and the front idler. Sometimes, especially when flotation is overemphasized, such wide shoes are used that the weight of the tractor isn't enough to push the grousers into the ground to their full depth. This cuts down the area of the grousers which actually penetrate the ground and help pull the tractor along—usually known as "pull-bracing grouser area." The results are that a large amount of pull-bracing grouser area is lost, the rolling resistance is increased, and track wear becomes greater because unnecessary leverage loads are imposed. All these factors add up to slower time cycles and loss of job efficiency.

Another factor to consider is wear and tear on the drive train of a tractor that is "wearing" too big shoes for the job conditions. When the shoes are so wide that the tracks will not slip under overloads in first gear, the drive train must take a lot of punishment from shock loads. Operators feel that the tractor lacks power. On the other hand, if the shoes slip in first gear, under heavy load, they prevent overloading and encourage the operator to take slightly smaller loads at higher speeds. Usually this practice increases work capacity and definitely reduces down time and maintenance costs. The subject of track-wear life enters into the picture, too. The ground underneath the track shoes must literally "turn with the tracks." A wide shoe increases twisting stress against pins and bushings, builds up greater leverage loads against roller flanges, and reduces tractor power on turns.

Big shoes are necessary here. Sideboom tractors "carry" instead of "pull" heavy loads. They need oversize truck shoes to provide extra flotation and to help prevent tipping.

When a very wide shoe travels over uneven or rocky terrain, a purely mechanical wear effect can take place. The very wide shoe offers a large area of "no contact" on rough or rocky ground and the leverage load imposed on the shoes by a moving tractor might be sufficient to bend them.

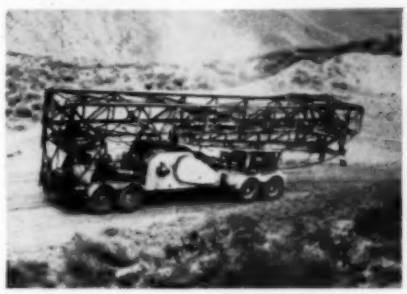
All these effects which often take place with wide track shoes mean increased rolling resistance and shorter track life. So don't overshoe your crawler tractor. While there are many applications where wide track shoes are necessary and desirable, you will find that most jobs are better done with recommended-width track shoes so that you get the maximum horsepower you pay for. You will get the benefits of less down time, longer track life, and, most important of all, better maneuverability, faster time cycles, and more work done at less cost.

*Supervisor, Industrial Power Sales Engineering, International Harvester Company.

SELF-PROPELLED OIL WELL SERVICING HOIST

A new oil well servicing hoist recently developed by the Hopper Machine Works of Bakersfield, California has proved to be so flexible in its operation that it has well earned the trade name of "Hoistmobile." It has earned this trade name especially because of the ease with which it can be moved from job to job under its own power and the facility with which it can be maneuvered into working position at the well. One of the first of these units manufactured was put to work by the Richfield Oil Corporation of Los Angeles, California. Its first assignment was in the Cuyama Valley which included the rugged Morales Canyon Sector, where curving roads combine with grades up to 20 per cent to make the going difficult. Rough terrain and hard-to-reach small well locations seemed to offer little hindrance to the mobility of the unit.

This is accredited to its unique design and also to the ample propulsion power furnished by a six-cylinder General Motors Diesel engine equipped with GM torque converter. On location the operator can drive into position at the well without complicated backing and with excellent visibility from the cab can see where he is going at all times. This, of course, is an important advantage from a safety and time saving angle. Basically, the Hoistmobile is a four-axle vehicle, 35 feet in length, with the engine mounted at the extreme rear, a double drum winch amidships, and a folding derrick at the front, over the cab. The chassis consists of two main full length longitudinal members, fabricated of alloy steel with suitable cross members. It is of the "double drop" type which provides maximum stability with the required wheel clearances. In addition, the chassis members serve as the engine base, the hoist base and as an integral part of the derrick base. The rear-end assembly is a standard tandem axle and differential unit equipped with dual wheels. The front-end assembly is a pair of tandem axles also, equipped with single wheels, but with both pairs of wheels steerable. This feature greatly increases the maneuverability of the vehicle by reducing the turning radius, and it eliminates tire damage by scuffing, which usually results from the use of tandem front axles with only the front pair of wheels being steered.



The overall length of the Hoistmobile is under 50 feet when its 90 foot derrick is folded to a ready-for-the-road position. A single GM 6-cylinder diesel with GM torque converter provides power both for propulsion of the vehicle and operation of the Hopper Hoist on the job.

Power for both propulsion and the hoist is furnished by a single six-cylinder Series 71 General Motors Diesel Engine Model 6082 equipped with torque converter. Because of its high horsepower capacity for its size, with corresponding light weight and convenient dimensions, this engine is furnished as standard equipment. Other engines can be furnished at the customer's option. The engine is mounted at the extreme rear of the vehicle with the radiator facing aft, and the torque converter output shaft forward. Immediately ahead of the converter output shaft, and coupled to it by a short universal joint shaft, is a right angle gear box, which has a straight-through shaft as well as one at 90° from the input. The straight-through shaft of the right angle gear box is coupled to the input of a Model TG 607 Allison Torqmatic transmission, which in turn drives back and down to the differential through another universal joint shaft. The TG transmission, which is hydraulically actuated and full-torque shifting, has three speeds forward, a neutral and a reverse, with the following ratios: 1st—4.4:1; 2nd—2.33:1; 3rd—1.0:1; Rev. —3.54:1; (overdrive ratio of .76:1 is effective on the above).

The vehicle controls are located in the one-man cab and they are astonishingly simple for a vehicle as large and heavy as the Hoistmobile. In the first place, the steering effort is reduced to a minimum by the use of a hydraulic booster. Then there is no clutch pedal; only pedals for the air brakes and foot throttle. The "gear shift" is a small lever mounted on the side of the cab with approximately 1 inch of travel required between successive positions corresponding to the transmission ratios. Certain features of the Hoistmobile such as the folding derrick and the tandem front axle assembly with all wheels steerable were originated by the Hopper Machine Works and are, therefore, understood to be currently exclusive to their manufacture.

Operators of shovels . . . draglines . . . cranes . . . rail cars . . . lift trucks . . . road machinery . . . tractors . . . mining machinery . . . logging equipment . . . oil well rigs are discovering the advantages of TORCON TORQUE CONVERTERS. This automatic hydraulic transmission features variable speed and torque ratios, and facilitates the full utilization of your power source throughout the entire range of operation.
TORCON CONVERTERS are available for applications involving horsepowers from 30 to 600. They can be furnished with and without cut-off clutches.
TORCON units assure *maximum utilization of horsepower,* provide for *more production at less cost, eliminate shock to powered equipment, reduce operator fatigue* and *increase* the *service life* of your machinery.
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USE MORE OF YOUR HORSEPOWER
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Florida Diesel News

By E. F. DENNIS

EL TABAK, first of several 150 ft. shallow draft freighters to be used by the Caribbean and Western Hemisphere Shipping Co. to carry sisal from small coastal towns in Haiti to the States and lumber on the return trip to Port-au-Prince; 4 G.M. 6-71s on 2 shafts, a G.M. 2-71, 20 kw. Delco generator along with a Hill 20 kw. generating set supply the auxiliary power. Jones Boat Yard engineered the hull and deck work; Diesel Sales Co., Miami, the engine room.

YACHT *Doubly Shot* was repowered with 2 G.M. 6-71s, Cleveland Diesel Division, G.M., Miami, engineered this splendid job.

THE *B.J.,* a twin screw 115 ft. combination shrimp trawler and freeze ship has 4 G.M. 6-71s with Snow Nabstedt reduction gears plus a 4 cyl. Hill 20 kw. Delco generating set. On deck are 2 Petter diesels driving 2 Worthington refrigeration compressors. Bendix Marine Supersonic depth recorder; owned by the Gulf-pac; home port is Fort Myers Beach.

SANTIAGO, CHILE to Honolulu; in first place is the record of the schooner yacht *Enchantress,* 136 ft. by 27 ft., powered with a 275 hp. Superior diesel and a Woodward governor, along with a 15 kw. Superior and a 25 kw. Buda, both with Delco generators. Larry W. Bicaise of Diesel Sales Co., Miami, is the proud owner of this beautiful ship.

DOLORES D., a new 67-ft. shrimp trawler for Alvin Dickey of St. Mary's, Ga. Powered with a 6-110 G.M. diesel, a 52x38 Columbia propeller and a Stroudsburg 3 drum hoist. Also delivered to Cornelius McGillicuddy, Jr., Fort Myers, a 65-ft. trawler, the *Connie Mac* as a sister ship to the *Evaline,* both have G.M. 6-71 diesels. Diesel Engine Sales of St. Augustine built these new trawlers, the engines came from General Motors Diesel Division, Jacksonville.

PANAMA BOUND from Fernandina and St. Augustine were a fleet of 11 shrimp trawlers, all were sold and transferred to Panamanian registry. Included in this colorful fleet were the *Falcon,* powered with an 8800 Caterpillar and the 60-ft. *Ocean Lady,* flagship of the fleet with a G.M. 6-71 diesel. Capt. Clinton Baverstock was the flotilla skipper.

ANOTHER 14-YD. LeTourneau Tournapull powered with a G.M. 6-71 for use on drainage canal projects in the Everglades for the H. L. Mills Construction Co.

MISS CLEM, a 65-ft. addition to the shrimp fleet of Robert Wilson, a D13000 Caterpillar diesel from the Gibbs Corporation of Jacksonville and a Snow Nabstedt 3:1 reduction gear.

FLORIDA Georgia Tractor delivered a model TD 24 International tractor dozer to Doug Tower of Homestead, making a total of 3 for construction work.

NUEVO DOMINICANO, a Dominican Republic passenger liner was the recipient of a G.M. 2-71 diesel with a 20 kw. Delco generator, to be used on the boat deck for emergency power; supplied and installed by Auto Marine Engineers in Miami.

UP AT Lake Beresford the Olsen Corp. is building 10 steel tugs for the Navy; cost to be about $2,000,000; powered with Atlas direct reversible marine diesels, rated at 600 hp. at 750 rpm. Complete with standard Atlas equipment.

RECENT INSTALLATIONS done at the J. Frank Knorr plant include a pair of 6 cyl., 2-cycle P&H Harnischfeger 145 hp. diesels in the cruiser *Georgiabel,* owned by Capt. Wally Whittemore. Snow Nabstedt reverse and reduction gears 1.5:1. Operates in South Florida and Bimini waters.

J. FRANK KNORR appointed new distributor for Enterprise diesels in the Miami and Tampa areas, also are factory representatives for the Snow-Nabstedt reverse and reduction gears, Kolher and U. S. Motors electric plants and Walter Kidde fire equipment.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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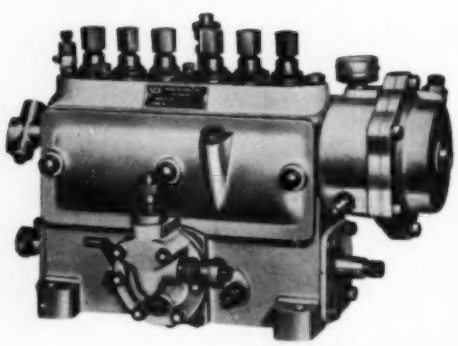

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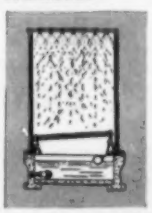
SAVE COOLING WATER...
and insure uniform heat transfer

When you use Binks Type "D" Heat Exchange Coils, here's what happens:

Hot water from the engine is pumped through the copper tubes of the coils (shown above). The coils are cooled by spraying them with raw water in a standard Binks cooling tower. Because jacket water is circulated through a completely closed system with virtually no evaporation, distilled or chemically pure water can be used economically in the jacket. This eliminates scale formation... increases engine efficiency.

The raw water used for cooling the coils is also recirculated. The only additional water needed is that to compensate for evaporation in the tower.



View showing placement of Binks Type "D" heat exchange coils in a cooling tower in relation to the spray system (at the top).

Send now for Bulletin 41 for complete engineering data.

Binks **MANUFACTURING COMPANY**
3132-38 Carroll Ave., Chicago 12, Ill.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

RDC's for Santa Fe

Southern California's first rail diesel car train service was inaugurated recently by Santa Fe Railway between San Diego and Los Angeles. The rail diesel car is an all-stainless steel, self-propelled railway passenger car created by the Budd Company. Santa Fe's RDCs will operate as a two-car train on two round-trip schedules daily between San Diego and Los Angeles. Two of the new RDC runs will provide non-stop "commuter" service from San Diego to Los Angeles and return on a schedule of two hours and 15 minutes, one half hour faster than previous schedules. The remaining two runs will operate on schedules of two hours and 45 minutes, making local stops at Oceanside, Santa Ana and Fullerton and flag stops at Del Mar, Encinitas, San Clemente, San Juan Capistrano, Orange and Anaheim. Cars placed in service by Santa Fe are known as the RDC-1 type. Each is air-conditioned and has a capacity of 80 persons, or 160 for the two-car train. Each car is 85 feet long and powered by two Detroit Diesel 275-horsepower diesel engines, with controls at both ends. Cruising speed is 70 miles per hour, with a maximum speed of 83 miles per hour under full load.

West Coast Branch

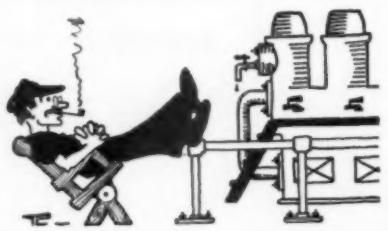
Sparkler Manufacturing Company, Mundelein, Illinois manufacturers of a complete line of filtration equipment, for industrial, commercial, institutional, and domestic use, has announced the opening of a new branch office and warehouse to serve the West Coast. Located at 612 N. San Vicente Blvd., Los Angeles 46, Calif., this new branch will offer expert engineering service to help solve any problem of liquid purification. The warehouse, located at the same address, will carry a stock of standard model filters, replacement parts, and a complete stock of supplies, including all types of filter aid and filter media. Sparkler has also announced that Mr. Richard E. Shields has been appointed West Coast sales manager. Mr. Shields, associated with Sparkler for many years, brings a broad background of experience in all phases of filtration to the eWst Coast branch, and will be available for consultation at any time.

Develops New Twin Spark Arrestor Silencer

A new twin silencer-spark arrestor, built specifically for use on the General Motors 6-71 twin or quad power plant, was recently designed and developed by Kittell Muffler and Engineering Co. The new 1244-HCT4 model utilizes two Kittell 1244-HEC4 horizontal spark arrestor-silencers, which are welded together and provided with offset intake nipples to match the twin exhaust manifolds of the GM diesel engines. As the exhaust gases enter the intake nipples they are whirled by a stationary impeller in such a manner that the sparks are thrown by centrifugal force into traps. Exterior plugs permit easy periodic cleaning. The exhaust gases then pass through the silencing compartment and out into the atmosphere.

The 1244-HCT4 is an all-welded, ready-to-mount, compact unit that is available for immediate delivery. A new twin standard exhaust silencer (1244-ECT4), without spark arrestor, is also available. For catalog sheet or additional information, contact DIESEL PROGRESS, File 99, P.O. Box 8458, Cole Station, Los Angeles 46, California.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



GRAHAM COUNTY
ELECTRIC CO-OP, Inc.
Pima, Arizona
1951

THERE'S ONLY ONE CHAMPION!

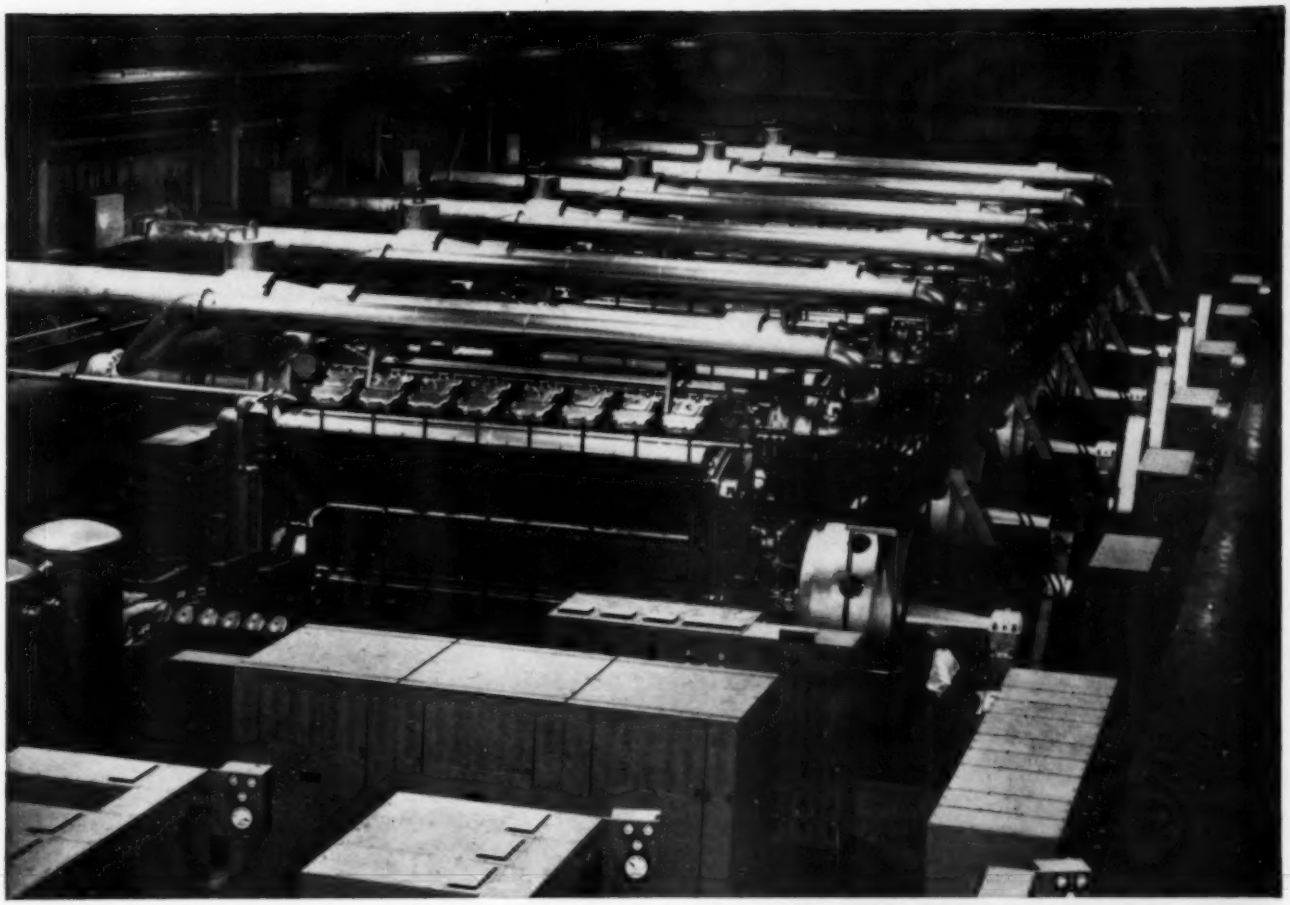
In every crowd there's one that stands out head and shoulders above the rest—one champion in a multitude of contenders.

Among all REA plants throughout the United States, Graham County Cooperative, Inc., Pima, Arizona, emerged as national champion for 1951, winning the annual Diesel Progress award for the most efficiently operated REA plant.

Congratulations to you, Graham County Co-op, on this well-merited success.

Richfield is proud to have supplied both the lubricating oils and the diesel fuel for this outstanding installation. We regard this as further evidence that... If It's Richfield, It's Right!

RICHFIELD
555 South Flower Street, Los Angeles 17, California



View of one operating floor showing six engine-driven G-E generators. These 3125-kva, 4160-volt units furnish a-c power for the general plant and auxiliaries.

In addition, other power plants house 74 d-c engine generators, each started and protected by G-E control.

Reynolds San Patricio plant features world's largest pot lines

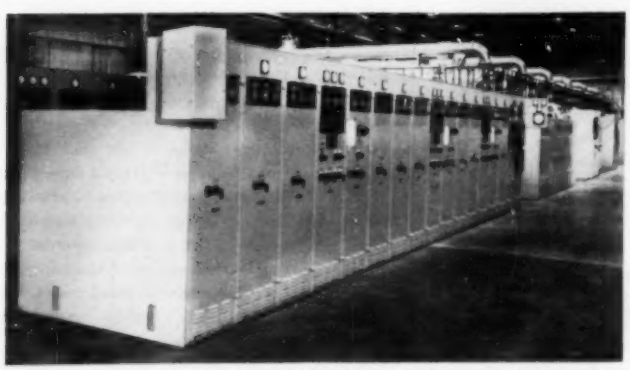
83 General Electric a-c and d-c generators furnish 187,000 kw for new plant

Dedication of Reynolds Metals Company's new $80,000,000 aluminum reduction plant near Corpus Christi, Texas, places on line the world's two largest pot lines with a combined output of 160,000,000 lbs/year of defense-vital aluminum.

The huge pot lines, and their power supply, mark another milestone in electrical engineering history. Successfully completed through close co-operation of the engine builders, Reynolds and G-E engineers, the tremendous system provides the efficient, closely co-ordinated electric power system Reynolds needed.

Working closely with your engineers and suppliers, G.E. can help *you* get on line faster, more economically with its engineering services and complete line of electric equipment. Consult your nearest G-E Apparatus Sales Office—early in your planning. General Electric Co., Schenectady 5, N. Y. 660-26

GENERAL ELECTRIC



Main metal-clad switchgear (one of three), rated 4160 volts, distributes a-c power from main generators and to the plant feeder circuits.

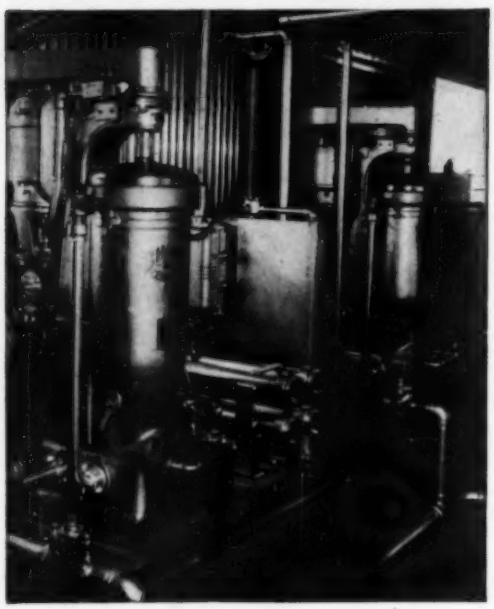
Each engine-generator set is started, controlled, and protected by one of these General Electric custom-built operator's control panels.

Answer to Garbage Disposal Problem

Perched on seven hills like its famous namesake, Rome, Ga., is a busy, growing city of 31,000 people. Like most expanding municipalities, Rome struggled for years with its garbage disposal problem and did not find a satisfactory answer until late in 1950. At that time the city purchased a Drott Bullclam mounted on an International TD-14A crawler tractor and began operating a sanitary landfill.

Located only two blocks from the city's main street, the landfill is actually becoming a valuable civic asset instead of a nuisance. Only garbage is handled here. Leaves, brush, and other wastes are trucked well away from the city and burned. Formerly swampland lying between the banks of the Etowah River and a main highway, the landfill is gradually becoming usable land as the alternate layers of garbage and earth fill up the swamp.

Six trucks haul garbage daily with 14 trucks in service on Saturdays. All points have garbage pick-ups on alternate days, and the business district has daily refuse removal service. Twenty tons of city garbage and two tons of refuse from the State Hospital make up the minimum daily tonnage placed in the sanitary landfill. According to W. C. Adams, sanitary superintendent, the city officials believe their sanitary fill is an "investment in the future. Garbage disposal at best is a dead expense, a necessary evil which is part of maintaining every city," Admas admits. "However, we are improving worthless property with our landfills. The one we are building now will change a low, swampy area into land on which we can build a park, a baseball field, or anything we desire. Its location within a few blocks of the main business district keeps truck traveling distance to a minimum. We have no complaints from the people living nearby. They seem to be merely curious as to what we are doing and regard the operation as another construction or excavation job." According to Mr. Adams, the clean, odorless sanitary landfill has solved all the nuisance problems normally found at garbage dumps. He believes that Rome's present refuse disposal system of strategically located sanitary landfills is operating at top efficiency with no objectionable features whatever. At the same time, the operation is increasing in value of the land used for disposal purposes.



3
SHARPLES
CENTRIFUGAL
PURIFIERS

keep air filter oil clean for 43 DIESELS
at Reynolds San Patricio Plant

Over 50,000 gallons of viscosene are required to purify the air used in the 43 diesel engines now installed at the new Reynolds Metals plant at Corpus Christi.

This highly viscous oil gathers in the abrasive dust, dirt, and moisture from the atmosphere so that only clean, dry air goes to the engines.

To keep this oil continuously free of contamination, three Sharples centrifugal purifiers with heaters are installed in the line. (Two of these units are pictured here.)

As the contaminants are collected by the oil, they are removed by the Sharples purifiers while the oil is being returned to the clean oil storage tank.

Sharples Oil Purifiers, which are complete self-contained units, are doing a broad job in the diesel engine field—purification of air filter oils, lubricating oils, ordinary fuels, and even residual oils, and pipe line crude for use as diesel fuel.

If you operate diesels on land or afloat, get in touch with Sharples.

SHARPLES

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NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • NEW ORLEANS • SEATTLE • LOS ANGELES • SAN FRANCISCO • HOUSTON

Two Personnel Changes

Harold H. Hall, right, new general manager of Cummins Diesel Export Corporation, discusses service policy with Charles C. Sons, left, now acting general service manager for Cummins Engine Company, Inc.

Two important changes involving Cummins sales division personnel are announced by L. W. Beck, Vice President-Sales, Cummins Engine Company, Inc., at Columbus, Indiana. Harold H. Hall, formerly general service manager, is now general manager, Cummins Diesel Export Corporation, with headquarters also at Columbus, Indiana. Charles C. Sons, formerly eastern service manager, has been named acting general service manager for Cummins Engine Company, succeeding Mr. Hall. Mr. Hall joined the Cummins service organization in 1938 as a service representative in the Southeastern Region. From 1940 to 1942 he was service and parts manager of the Cummins Dealership at Memphis, Tennessee. During the war years of 1942 to 1945 he served in the U. S. Navy as an engineering officer. Returning from service in 1945, Mr. Hall became a field service representative for the Company working on field testing problems associated with the development of the 275 hp. Model NHBS-600 and 200 hp. Model NHB-600 Cummins Diesels. In March, 1947, he became manager of the Cummins Dealership at St. Paul, Minnesota and held this position until December, 1948 when he returned to the factory in Columbus as general service manager. A native of Freewater, Oregon, Mr. Hall was educated at Rollins College and the Univeristy of Florida. Previous to joining Cummins he was equipment superintendent in the construction field, and an erection engineer doing power plant work.

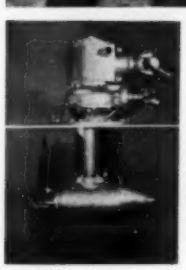
Mr. Sons is a 1941 graduate of the University of Missouri. He formerly was employed by Curtiss

Wright Corporation at Caldwell, New Jersey, as an assistant project engineer in the propeller design section. He joined the Cummins Research Laboratory staff in 1947 as a field engineer. In February, 1950, Mr. Sons was transferred to the Cummins Diesel Sales Corporation Dealership at Hibbing, Minnesota and worked on the Iron Range as a field engineer. Mr. Sons returned to the factory at Columbus in January, 1951, when he was named eastern service manager, a position he has held until this new appointment.

Consolidates Related Products Line

It has been announced by M. W. Smith, president, Baldwin-Lima-Hamilton Corporation that as a further step in the consolidation of related product lines, the Lima Division and the Austin-Western Company, a wholly owned subsidiary, have been combined into one internal operating unit. However, the products of both organizations will continue to be sold under present names and trademarks. Mr. McClure Kelley will be general manager of this Construction Machinery Division and will continue as president of Austin-Western Company. Mr. Henry F. Barnhart has been appointed assistant general manager of the Construction Machinery Division and will also continue as vice president of Baldwin-Lima-Hamilton Corporation and general manager of the Lima Works. Mr. Ralph K. Stiles has been appointed director of sales of the Construction Machinery Division and will also continue as executive vice president of Austin-Western Company. It is expected that this step will increase the efficiency and effectiveness of these operations and permit the new Division to offer improved and broader service to customers.

Launched



St. Louis Shipbuilding & Steel Co. has just completed for use at their St. Louis Yard, a harbor boat, the M/V *Gunnel*. The hull is 36 ft. x 12 ft. x 6 ft. 6 in. with a draft of 3 ft. 4 in. Recognizing the need for maneuverability in a boat of this type, an Allgire rudderless unit was installed in the *Gunnel* which is powered with a General Motors Model 6-71 diesel engine developing 135 hp. at 1650 rpm. An unusual feature of the *Gunnel* is the Vaporphase type of cooling for the main engine. In the Vaporphase cooling system the engine is operated at a temperature a few degrees above 212°, and the cooling is accomplished by having the circulating water flash into steam in the Vaporphase unit. This steam is then condensed and the water recirculated.

Manager of Industrial Engine Sales

John W. Tucker, formerly sales manager for Hall-Scott Engines in Southern California, has been appointed manager of industrial engine sales for Cummins Service & Sales, Los Angeles, according to J. R. Neal, sales manager. Mr. Tucker has been connected with Hall-Scott for the past 23 years, the last four years as Southern California sales manager. During this time he has been a pioneer in adapting multi-cylinder engines for use in the marine and petroleum industries. From 1945 to 1948 he was also sales manager in Southern California for the A. C. F. Brill buses. He is a member of the Los Angeles S. A. E. Chapter, Pacific Coast and Intermountain Association of Fire Chiefs and the American Petroleum Institute. "Mr. Tucker is one of the most experienced men on the coast on the adaption of multi-cylinder engines to industrial uses," Mr. Neal stated, "and we know that anyone concerned with power for petroleum and other industrial applications will benefit from his experiences."

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

OUTBOARD PROPULSION CAN SAVE YOU MONEY

Compare the Money-Saving Performance of the HARBORMASTER Outboard Unit in the Marine Industry Before You Build, or Before You Re-power

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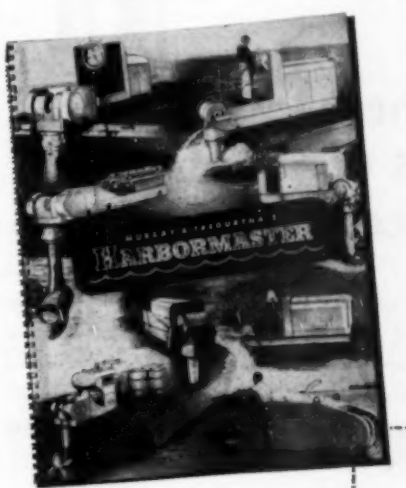
The Harbormaster Outboard Propulsion and Steering Unit brings powering of barges, towboats, tugs, lighters, derricks, ferries, etc. to a new high peak of efficiency. Hundreds of these heavy duty units are in daily operation. Operators are saving thousands of dollars in many marine applications because of the natural advantages of outboard propulsion.

How fast can you get there, and how much pay load can you carry? These are the questions you need to have answered, and in the great majority of cases you will find the best answer in the Harbormaster. You get the ultimate in maneuverability with Harbormaster, which allows you to steer instantly with full power in any direction, through the patented M&T 360° Propeller Thrust Steering Control. You get tremendous savings in fuel expense because you have more thrust per horsepower.



Important features that save time and money include exclusive 180° Elevating Mechanism which allows 1-man operator to easily maintain and service the equipment; and Patented Shear Pin, which automatically shears off should underwater assembly strike a submerged obstacle, thus opening up vast new shallow water fields to continuous, reliable operation. Harbormaster models, for all marine purposes, are available in sizes from 20 to 300 h.p. engines, gas or diesel power.

You'll find this data, and further valuable information, in our comprehensive catalog containing over 70 photos and diagrams. Gladly sent you on request, whether you have immediate or future use for Harbormaster units. Why not write for the catalog *now* so that you will have full information on file?

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Kentucky Plant

In a reversal of the usual westward expansion trend, Winslow Engineering Company, of Oakland, Calif., has announced the opening of a new factory for the manufacture of Winslow filters and elements in Murray, Ky. The announcement, made by President Charles A. Winslow of the Pacific Coast firm, disclosed that the new plant is expected to get into production within the next few weeks and will be operated independently under the name of Winslow Engineering, Inc. Formal opening of the new factory was marked by impressive welcoming ceremonies conducted by city and state officials and the Murray Chamber of Commerce. At an Appreciation Banquet attended by more than a hundred Murray business leaders and their wives, Mr. Winslow was presented with a key to My Old Kentucky Home by Ronald Churchill, president of the Murray Chamber of Commerce, and was welcomed to the Kentucky city by Mayor George Hart. Laurence L. Moore, Winslow's vice-president in charge of manufacturing, was commissioned a Kentucky Colonel by State Senator James Lassiter in behalf of Governor Lawrence Wetherby.

Manager of the new plant is Joseph L. Kern, formerly office manager at Winslow's Oakland headquarters. Mr. Kern, who has been with the filter manufacturer for the past nine years after a long career in the banking business, has been joined in his eastern move by a fellow Californian, Donald R. Robinson, who was named production manager.

Mr. Robinson, a Navy veteran of World War II, joined the Winslow organization in 1941. The eastern assignments given to Mssrs. Kern and Robinson resulted in appointments of two other men to new positions at the Winslow plant in Oakland. Martin J. Duffy, a former instructor in diesel engineering at United States Merchant Marine training schools in both New York and California, has been named office manager. This is his sixth year with Winslow. Jewell S. "Duke" Welch, who joined Winslow in 1950 after 25 years with Hall-Scott Motors in employee relations capacities, has been appointed personnel manager.

Discussing his firm's eastern expansion, Mr. Winslow pointed out that the establishment of the new factory does more than merely increase the potential output of products. "Elimination of much of our trans-continental shipping," he declared, "will mean substantial savings, both in delivery time and in transportation costs. These are important economies, both to customer and manufacturer, in the highly competitive situation which prevails in this industry."

Eaton
Diesel Engine Valves,
Bolts, and Studs

Produced to meet the exacting requirements of Diesel Engine Service

A background of many years of experience as suppliers to the Diesel engine industry gives Eaton a thorough understanding of the peculiar problems encountered in this highly specialized field. Eaton has made far-reaching engineering contributions applicable to practically all types and sizes of Diesel engines. Greatly enlarged manufacturing facilities permit the production of highly-stressed main-bearing and connecting rod bolts with forged heads, under strict metallurgical and quality control.

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Added to Chicago Field Staff

Charles R. Carmichael

Charles R. Carmichael has been assigned to the Chicago sales office of Enterprise Engine & Machinery Company as a sales engineer. Mr. Carmichael spent three years in the Army Corps of Engineers in heavy-duty construction and administration. Following his Army service he returned to the University of California and graduated with a mechanical engineering degree. His work at Enterprise in development and test afford Mr. Carmichael an excellent background for diesel field work.

Engineering Chiefs Meet

Retired and present Cummins engineering chiefs meet. H. L. Knudsen (left), for many years vice-president-engineering, Cummins Engine Company, Inc., Columbus, Indiana, and D. J. Cummins, (right), the Company's present vice president-engineering, recently got together during a visit of Mr. Knudsen to the factory. Mr. Knudsen is now retired and lives in Santa Monica, California. He is a member of the company's board of directors. Mr. Cummins was elected to the board of directors this spring.

A NATION-WIDE *Authorized* SERVICE ORGANIZATION

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San Diego 1, Magneto Sales & Service Co., 1254 Kettner Blvd.
San Francisco 3, Furrer & Uster, Inc., 225—7th St.
San Francisco 3, H. G. Makelim Magneto Repair Co., 1583 Howard Street
Wilmington, Diesel Control Corporation, 218 North Marine Ave.

COLORADO
Denver 3, Central Supply Co., 1171 Lincoln Street

FLORIDA
Jacksonville 1, Spencer Electric Co., Inc., 40 West Beaver Street
Miami 36, Florida Diesel Service Co., 1930 North Miami Ave.

GEORGIA
Atlanta 3, Auto Electric & Magneto Co., 477 Spring Street, N. W.

ILLINOIS
Chicago 16, Illinois Auto Electric Co., 2011—37 Indiana Ave.
Rock Island, Lohse Automotive Service, Inc., 430 North Capitol Ave.

INDIANA
Indianapolis, Gulling Auto Electric Inc., 450 North Capital Ave.

IOWA
Cedar Rapids, Edwards Carburetor & Electric Co., 209 Seventh St., S. E.
Des Moines 9, Electrical Service & Sales Co., 1313 Walnut Street

LOUISIANA
New Orleans 13, John M. Walton, Inc., 1050 Carondelet Street
Shreveport, Vaughan Tractor & Auto Parts Co., 224 Airport Drive

MARYLAND
Baltimore 1, Parks & Hull Automotive Corp., 1033 Cathedral Street

MASSACHUSETTS
Boston 15, W. J. Connell Co., 121 Brookline Ave.

MICHIGAN
Detroit 2, Knorr-Maynard, Inc., 5743 Woodward Ave.

MINNESOTA
Minneapolis 2, Reinhard Bros. Co., Inc., 11 South 9th Street

MISSOURI
Kansas City 8, Electrical & Magneto Service, Inc., 2538 Grand Ave.
St. Louis 23, Diesel Fuel Injection Service Co., 9331 South Broadway

NEBRASKA
Omaha 2, Carl A. Anderson, Inc., 16th and Jones Street

NEW JERSEY
Newark 2, Tire Trading Co., 239 Halsey Street

NEW YORK
Brooklyn 16, E. A. Wildermuth, Inc., 1102 Atlantic Ave.
Brooklyn 32, A & D Diesel Service, Inc., 677 Fourth Ave.
Buffalo 8, Hettrich Electric Service, 1032 Ellicott Street
Syracuse 4, F. A. Crossman, Inc., 943 Genesee Street
Troy, Ehrlich Electric Service, Inc., 200 Fourth Street

OHIO
Cleveland 14, Cleveland Ignition Co., 1301 Superior Ave., N. E.

OKLAHOMA
Tulsa 3, Magneto Ignition Co., 701 West 5th Street

OREGON
Portland 14, Automotive Products, Inc., 1700 Southeast Grand Ave.

PENNSYLVANIA
Philadelphia 32, J. W. Parkin, Jr., 2251 North Broad Street
Pittsburgh 13, Automotive Ignition Co., 6358 Penn Ave.

TENNESSEE
Memphis 4, Automotive Electric Service Co., 982 Linden Ave.

TEXAS
Dallas 1, Beard & Stone Electric Co., 3909 Live Oak St.
El Paso, Oakes Battery & Electric Co., 423 Texas Street
Houston 1, Beard & Stone Electric Co., Milam at Polk Street
Houston 11, Magneto & Diesel Injector Service, 6931 Navigation Blvd.
Odessa, Electric Service & Supply, 1601 North Grant Street

VIRGINIA
Norfolk, Diesel Injection Sales & Service, 808 Union Street
Richmond 20, Charles H. Woodward Electric Co., 709 Broad Street

WASHINGTON
Seattle 1, Seattle Injector Co., 2706—2nd Ave.
Seattle 14, Sunset Electric Co., 300 Westlake, North
Spokane 8, Sunset Electric Co., North 703 Division St.

WISCONSIN
Milwaukee 2, Wisconsin Magneto Co., 918 North Broadway

CANADA
Quebec—Montreal—International Electric Co., 1037 Bleury St.
British Columbia—Vancouver—Magneto Sales & Service, Ltd., 126 Gore Ave.
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Anchorage, Reeve Alaska Airmotive, Merrill Field, P.O. Box 1160

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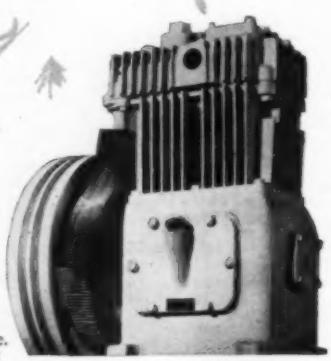
Petter Engine Sales Program

Brush ABOE, Inc., formerly known as ABOE, Inc., have during the past few months been actively engaged in reorganizing their Petter small diesel engine marketing technique. David W. Mansell, vice president of Brush ABOE, Inc., reports that the responsibility for sales of Petter diesels has been decentralized with a view to improving coverage, reducing operating overheads and furthermore increasing sales. In forming this plan, which so far has proved to be most effective, a number of Petter distributors have been appointed as direct factory agents and are now solely responsible for promoting sales and providing adequate service facilities in their respective territories. Among those agents already appointed are Atlantic Equipment Company of Boston; Beland-Cross, Inc., New York; Motor Parts Machine Company, Seattle; Shepherd Tractor & Equipment Company, Los Angeles; West Coast Engine & Equipment Company, Berkeley, California.

The New York office of Brush ABOE, Inc., while being engaged in other Brush ABOE Group activities, are primarily interested in giving their closest support to promoting the Petter diesel engine business. To assist agents with any technical or commercial problems that may arise from time to time a staff of factory trained engineers are available in New York. The Petter small diesels are built in sizes from 3 to 36 hp. and included in this range are two lightweight aircooled engines developing 6 and 12 hp. at 1800 rpm. respectively. As a result of recent increased production facilities the factory is now in a position to give very attractive deliveries.

AND IN YOUR BUSINESS . . .

Quincy COMPRESSORS



When it comes to DEPENDABLE COMPRESSED AIR SUPPLY, Quincy Compressors can be as important as the mountain climber's lifeline. Quincy builds a complete line of modern, compact, rugged compressors in sizes from 1 to 90 c.f.m.

There's a Quincy Compressor for *your* job! Depend on a Quincy specialist to help you select the type and size to meet your specific needs.

Write Dept. K-25 for details

Only Quincy OFFERS ALL THESE FEATURES

- Timken Bearings
- Lynite Rods
- Perfectly Balanced Crankshaft
- Copper-Finned Intercooler
- Automatic and Positive Lubrication

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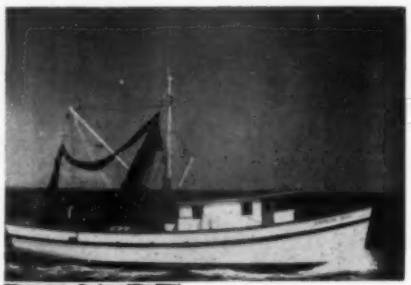
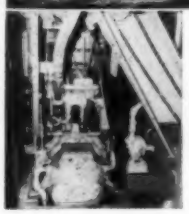
QUINCY, ILLINOIS

Branch Offices: NEW YORK PHILADELPHIA DETROIT CHICAGO ST. LOUIS DALLAS SAN FRANCISCO

Manufacturers of Air Compressors Exclusively

Florida Shrimp Trawler



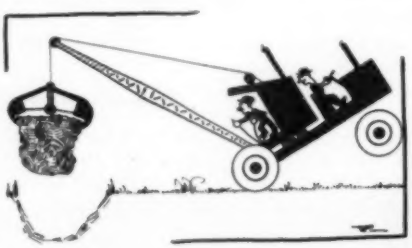


The *Empress Mary* on her trial run, and left, the engine room showing the D13000 Caterpillar diesel engine and Snow Nabstedt 3:1 reduction gears, engineered by Shelly Tractor & Equipment Co.

Empress Mary, built by the Miami Shipbuilding Corp., was the first shrimp trawler built under contract to the Shelly Tractor and Equipment Corp. by several Florida shipyards, each are 65 x 18 x 6 and designed by the shipyard in which they were built. All are or will be powered with model D 13000 Caterpillar diesels, Link Belt chain and jack shaft "power take-off." Snow Nabstedt 3:1 reduction gears and the 4 blade 48 x 44 propellers push them at about 11 mph. The *Empress Mary* is owned by John Marinzulich of Woodcleft Fisheries, Port Royal, South Carolina and now fishing out of Fort Myers to the Campeche shrimp grounds.

Canadian Diesel Course

The National Supply Co. participated in a diesel engine course conducted by the Department of Extension, University of Alberta, at Edmonton, Alberta, Canada. Arranged at the request of the Western Canada Petroleum Association and the Canadian Association of Oilwell Drilling Contractors, the course began on June 2 and continued until June 20. Its purpose was to train oil industry personnel in the proper installation, operation, and maintenance of diesel engines. J. D. Stewart and A. B. Reese, Jr., of the Engine Division, The National Supply Co., conducted two three-hour sessions during the last week of the course. A Superior Diesel Engine, made by National Supply, was exhibited.



Nordberg Distributor

Appointment of Olson Equipment Company, 2930 Blaisdell Avenue, Minneapolis, as distributor for Nordberg 4FS Diesel engines in Minnesota and northwestern Wisconsin is announced by Nordberg Manufacturing Company, Milwaukee 1, Wisconsin.

Manufacturers and distributors of construction equipment and supplies, the Olson firm began operation in 1945. With its modern headquarters in Minneapolis, the company has the facilities to repair all types of engines and its service personnel has had extensive training in this field. In addition to its central sales office, Olson Equipment Company has five experienced salesmen in the territory to assure prompt customer service. Mr. R. E. Olson is president of the organization; F. L. Gruber, vice president; S. C. Olson, treasurer; B. W. Olson, secretary; J. Novotney, office manager and O. Kirsch, service manager.

Nordberg 4FS diesel engines are built in one, two and three cylinder models with a 4½ in. bore and 5¼ in. stroke and range in power from 10 to 45 hp., 1200 to 1800 rpm. These four-cycle, heavy duty engines have been developed expressly for the small power user. They are offered as complete, self-contained, ready to operate electric generator sets, centrifugal pump units and with clutch or stub shaft power take-off to meet the varied demands for compact, economical units of low horsepower.

Federal-Mogul Appointments

Federal-Mogul Corporation has announced the retirement of Stafford C. Reynolds, senior vice president and treasurer, who will continue as a member of the board of directors, and E. R. Darby, vice president-research and development, pursuant to the provisions of its employees retirement program. Edwin Olney Jones, vice president and secretary, has been elected senior vice president and secretary. Samuel E. MacArthur has been elected treasurer and he will also retain his former title and duties as controller. Gordon J. LeBrasse, formerly superintendent of the research laboratory, has been named acting director of research.

Mr. Reynolds was one of the founders in 1915 of the Federal Bearing and Bushing Corporation, one of Federal-Mogul's predecessor companies. He has been treasurer and a director throughout his 37 years with the company, and was re-elected to the board of directors at the annual shareholders meeting on April 29, 1952. E. R. Darby joined the company in 1929 to head its research program, and continued in that capacity until his retirement. He was made vice president in 1948. Olney Jones has held high ranking sales positions in the original equipment division since he joined the company in 1919. He has been a member of the board of directors since 1929, was elected vice president in 1943 and secretary in 1944.

S. E. MacArthur joined the company as assistant controller in 1942 and was promoted to controller in 1945. He was born in Philadelphia, Pa., in 1910. He is a graduate of Drake University and had worked in various capacities for seven years with the U. S. Gypsum Co. in Chicago before coming to Federal-Mogul. He is currently president of the Detroit Control of Controllers Institute of America, a member and former associate director of the Detroit chapter of the National Association of Cost Accountants, and a member of the research committee of the American Accounting Association.

Gordon LeBrasse has been employed by Federal-Mogul as a metallurgist since 1940, and has been superintendent of the company's research laboratory in Ann Arbor since 1949. He was born in Jersey City, N. J., in 1914. He is a graduate of the Rennsselaer Polytechnic Institute and was employed four years as a metallurgist at the Driver-Harris Company of Harrison, N. J., before coming to Federal-Mogul. Mr. LeBrasse is a member of the American Society for Metals, serves on the bearing and bushing subcommittee of the Society of Automotive Engineers, and is a member of the nonferrous research committee of the American Foundrymen's Society.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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- **Starting motor can be mounted more easily and in more positions.**
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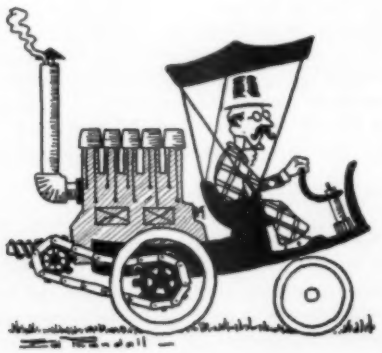
Two Busy Ladies

Since 1947 two very busy ladies have played an important part in stepping up the production of the Bath Canning Company at Bath, Maine. These two ladies are identical twins and are known as the *Lou Ann* and the *Ruth May*. They are sardine carriers who travel the Maine coast picking up sardines from seiners for processing at the factory. Each has a pay-load capacity equal to 1800 bushels and has a cruising speed of 11 knots at 1600 rpm.

The reason these ladies have played such an important part in the company's successful operation is their dependability in maintaining a steady flow of sardines to the factory. Sardines, of course, must be processed immediately upon arrival and any interruption in the delivery schedule sends workers home and idles processing machinery. According to Peter Mitchell, general manager of the company, the performance of these two boats has met the company's most exacting requirements for the last five years. The boats were built in 1947 in Thomaston, Maine by Newbert and Wallace. Mr. Mitchell has very definite ideas about the type of craft he needed and worked closely with Roy Wallace, the designer, in drawing up the specifications. The boats are of wood construction and have an over-all length of 78 ft., a beam of 17 ft. 6 in. and a draft of 8 ft. They are powered by General Motors Twin-six Diesels driving a single screw 52 x 40 through 4 to 1 reduction. They are equipped with hydraulic reverse gears. Operating equipment includes Sperry hydramatic controls, ship-to-shore phones and Cape Cod navigators.



Installs Test Engine

Sinclair Research Laboratories, Inc. has received and installed a special railroad diesel test engine, according to an announcement by W. M. Flowers, president. "This engine," Mr. Flowers stated, "was designed by the Electromotive Division of the General Motors Corporation, and is the result of more than six years of experimentation and refinement by General Motors. While it has only two cylinders the component parts, insofar as possible, are the same size and shape as those in large 16-cylinder commercial engines used on railroads throughout the country."

It is known as EMD 2-567B diesel, and has a 2-cylinder "V" type 2-stroke cycle engine with an 8½-in. bore, 10-in. stroke with 567 cubic inch displacement. At rated speed and load of 800 rpm-188 brake horsepower, the fuel consumption is approximately 11½ gallons an hour. Lubricating oil capacity of the crankshaft is 40 gallons and the water jacket capacity, 22 gallons. With the exception of a shorter crankshaft and camshaft, more counterweights to eliminate vibration, one blower instead of two and one oil filter cartridge instead of the usual four found on a locomotive, the engine uses standard locomotive parts in all locations.

At the present time it is being used for testing and development of lubricating oils for heavy duty diesel service. Operating test periods will range from 300 to 500 hours at 800 rpm. brake horsepower with elevated oil and water temperatures.

This is equal to the severest condition encountered in railway service. It will be inspected at 100-hour intervals at which time samples of crankcase oil will be removed and sent to the laboratory for analysis and spectrographic examination. The results thus obtained will be used as an indication of oil stability and engine condition. At the conclusion of the test period the engine will then be disassembled and all parts inspected, rated and measured for wear.

Jacket water rust inhibitors will be tested at the same time oil tests are in progress. This will be accomplished by inserting metallic test strips in the water jacket passages at the beginning of the test and removing them at its conclusion. Study of the surface appearance of these strips and the weight loss, if any, will determine the effectiveness of the inhibitor. Approximately two months were required to transport the engine and generator assembly from the factory at La Grange and set it up in the Sinclair laboratories at Harvey, Illinois.

Elected Senior Vice President

At the annual meeting of the Board of Directors of the Elliott Company, R. W. Owens was elected to the office of senior vice president. Mr. Owens joined the Elliott Company in January of 1944 as assistant to the president. Late in the same year he was elected vice president in charge of manufacturing, which position he held until his new appointment last month.

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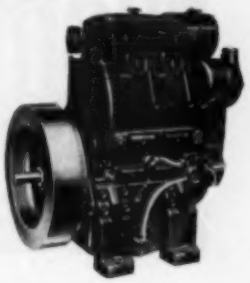

BRUNSWICK Navigation Company's "PLAXCO," at Southport, N.C. Equipped with a pumping unit built by the Curtis Marine Co., of Norfolk, Va., powered by a Lister-Blackstone Model FR 2 Diesel Engine, delivering 16 H.P. at 1500 rpm, or 18 H.P. at 1800 rpm.

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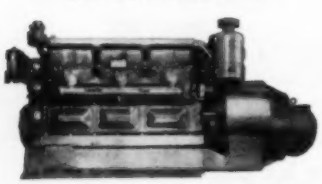

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Good "Feeding Habits" for Your Diesel

By FRED J. SHRECK*

THE power plant of most construction machinery is a diesel engine whether used to drive crawler or wheel tractors or self-propelled rubber-tired scrapers. Diesels are the most common power plants for cranes, hoists, mixers—in fact, almost every machine found on construction jobs. The diesel has proved itself by billions of hours of productive work using low-cost fuel and turning out energy under the most rugged working conditions. Yes, the diesel engine is mighty dependable, but it must be treated right or it cannot do its job. The two essential items in the diesel's "food supply" are clean fuel and clean air. Diesels are economical with fuel, but they suck in air like a mile runner on the last lap. For example, a thousand-cubic-inch diesel engine, running at rated rpm., breathes in approximately 865 cubic feet of air a minute, or more than 415,000 cubic feet of air in eight hours. This is enough air to fill a building 100 feet square and four stories high.

Above all, the fuel and air fed to the diesel must be clean. Clean lubricating oil is desirable and important, but not nearly so important as clean fuel and air. That's why diesel engine manufacturers lavish such care on the design and manufacture of fuel filters and air cleaners. Without these units, the rugged, durable diesel would strangle itself, choked by dirty air or damaged internally by foreign matter in the fuel. These are reasons why it pays big dividends to provide proper storage for fuel and give regular attention to the air cleaner. Naturally, it is smart practice to use only the grade of fuel recommended by the manufacturer. Some fuel suppliers will offer substitutes that are "just as good" to hear them tell it. But the recommended grade of fuel will produce the amount of horsepower at the drawbar which the manufacturer guarantees. It doesn't make sense to use inferior fuels and thereby lose power. Buying good fuel is only the first step toward insuring proper food for your diesel. Proper storage of fuel is equally important. Fuel may be properly stored either above or belwod ground, but the latter method is preferred since underground temperatures are more constant and there will be less condensation in the tank. However, in either method, provision should be made for accumulation and removal of water and sediment from the tank. A drain at the base of the tank should be provided to remove periodically the water and sediment that settles there.

The pump suction should not reach this part of the tank so that there will be no chance of sucking up water when pumping fuel from the tank into tractors or other machinery. A screen filter should be provided in the storage tank filler neck, and, of course, the filler opening should be carefully capped. Also, the nozzle of the fuel tank hose should be hung in a protected place so that dirt and water cannot enter the supply from that spot. Occasionally, fuel from small containers is emptied into the storage tank. This is bad practice since these small amounts of fuel frequently contain some gasoline or kerosene, and even these small quantities can contaminate the entire fuel supply in the storage tank. It is far better to use this fuel to wash parts or else dispose of it.

Watch the glass water trap in your tractor engine. If water is accumulating in these traps at a rapid rate, it's a pretty good indication that contamination is taking place where the fuel is stored. All these precautions add to the life and efficiency of the fuel filters which guard the injection systems of your diesel engines. Fuel filters are the final guardians of the diesel engine's food supply. They must be nearly 100 percent efficient to prevent foreign matter from entering the injection system where the extremely close tolerances cannot accept it. A diesel injection pump is built to precision tolerances finer than the finest watch, and watches cease to work when dirt enters them. There are no rigid rules for changing fuel filters, but low readings on the fuel pressure gauge ordinarily indicate a stopped-up fuel filter. If the filter must be changed, replace it with the type approved by the manufacturer. Be very careful to insure positive sealing so that the filter will work efficiently. Poor sealing makes the best fuel filter almost useless. However, you won't have to change fuel filters very often if your fuel supply is properly stored and cared for. Since fuel filters are not cheap, it pays off to store your fuel properly.

The other important item in a diesel's diet is air, and that, too, must be kept clean before the engine breathes it. Diesel engine manufacturers design and build adequate air cleaners into their products so that the engine will get enough clean air to develop its full rated horsepower. On construction jobs the air is frequently extremely dirty, and under these conditions it is wise practice to extend the air cleaner intake pipe so that it will reach the cleaner air above the dust level. Erroneous claims have been made that extended air cleaner pipes tend to smother an engine. Actually, the opposite is true, since there is a greater column of air in the extended pipe. Under dusty operating conditions, it is important to clean out the air cleaner at frequent intervals. The oil tray should be removed and washed and then filled to the proper level with the weight of oil recommended by the manufacturer. But oil changing alone is not enough. Be sure to remove the screens in the upper portion of the air cleaner and wash them in kerosene before replacing them. To insure a thorough job, follow the manufacturer's instructions in the owner's manual.

Even though the air cleaner is functioning perfectly, there are other spots which can develop air leaks and allow dirty air to enter the engine. For example, leaks are likely to develop at the connection between the air cleaner and the intake manifold and between the intake manifold and the cylinder head which is sealed by gaskets. These points should be checked at frequent intervals by taking an oil "squirt" can filled with water or kero-

*Supervisor of Service, Industrial Power, International Harvester.

sene and squirting this fluid around the joints. If any liquid is sucked into the engine, there is an air leak at that spot. Such air leaks demand immediate repair to prevent serious damage to the engine. The precautions mentioned here are not time consuming and require little effort. Yet they will extend the life and increase the efficiency of your diesel engines to a remarkable degree. The diesel's diet demands scrupulously clean fuel and clean air. "Keep 'em Clean" is the watchword for these items. By giving proper attention to the numerous devices designed to protect the fuel and air supply from contamination, you can be sure that your diesel will be a "healthy" and husky worker as it hums a sweet song of power that gets the tough jobs done.

Regional Manager for Middle East

J. R. Hutchison has been appointed regional manager for the Middle East for Worthington Corporation, according to an announcement by S. R. Williams, vice president in charge of foreign business. Mr. Hutchison will manage Worthington's activities in Cyprus, Egypt, Greece, Iran, Iraq, Israel, Lebanon, Syria, Trans-Jordan and Turkey, Williams said. An 18-year Worthington veteran, Mr. Hutchison has served successively as application, sales and then field engineer in Worthington's pump, priorities, compressor and export departments. More recently he has served as a compressor specialist in the export department. He received his B.S. degree in mechanical engineering at Newark College of Engineering, Newark, N. J. in 1943 and is a member of the American Turkish Society, Inc., of Ankara and New York City. He will be headquartered at Emlak Cadessi, 20/3, Instanbul, Turkey.

General Sales Manager

J. C. Bascheart

Mr. L. F. Shoemaker, vice president, The Buda Company, Harvey, Illinois, recently announced the appointment of Mr. J. C. Bascheart as general sales manager of the Engine Division of The Buda Company. Mr. Bascheart, who is now headquartering at Harvey, Illinois, is responsible for all wholesale and retail sales of Buda engines and generators. Mr. Bascheart, associated with The Buda Company for twenty-six years, was transferred to the Harvey office in 1951 as sales manager after serving eleven years as president of Buda Engine & Equipment Co., Dallas, Texas. Previous to this, Mr. Bascheart was transferred to the Oil Field Division of The Buda Company in 1929 and appointed manager of this division in 1935. Since joining The Buda Company in 1926, Mr. Bascheart has worked in various departments of the company, including the Service Department as a service engineer in the eastern territory.

YOUR COPY OF DIESEL ENGINE CATALOG in its seventeenth completely re-edited, revised and expanded edition came off the press June 14th. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this limited edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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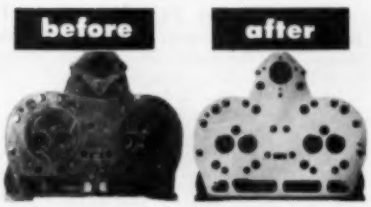

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ONE OF THE FEATURES Responsible for Its Overwhelming Preference by Leading Diesel Manufacturers and Operators

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TEMPERATURE REGULATOR

For Jacket Water and Lube Oil Control

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IMPORTANT ADVANTAGES

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- ***Temperature Ranges*** 50 to 250° F. and 150 to 350° F.
- ***Easy to Install*** Requires 15 lb. supply of compressed air or water for its operation.
- ***Small Size***—regulator head is only 2 7/8" x 3 5/8", sensitive bulb is 12" long with 1/2" I.P.S. connection.

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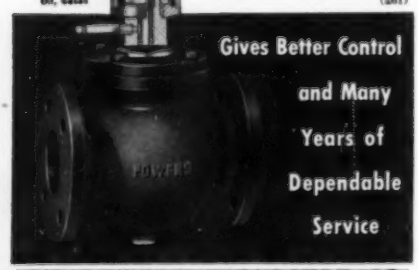
Special Cast Iron Steering and Top Only 4 Bolts
Compressed Air or Water Operated
Controls flow of Steam, Water Oil, Gases

You will get TOP Performance with this Better Valve Top.

Durable moulded neoprene diaphragm (1) has positive sealing bead which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment. (a61)



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NEARLY 100 representatives from 50 railroads in all parts of the United States and Canada attended a two-day symposium recently at Schenectady as guests of the American Locomotive Company. Subject of the symposium was the use of the spectrograph in analyzing diesel engine lubrication oil to detect and prevent serious engine trouble. Chairman of the conference was H. R. Sennstrom, Alco research and testing engineer, who gave a detailed description of Alco's own spectrographic work over the past several years.

Briefly, the spectrograph, as used in railroad applications, is a device that makes a photographic record of the various metallic elements found in diesel lubricating oil removed periodically from diesel engine crankcases. An analysis of the spectrum photograph results in a quantitative indication of the metallic elements present in the oil sample. Interpretation of the relative quantities of these metallic elements results in an understanding of the specific condition of many engine components, such as pistons, piston rings, cylinder liners and bearings. Alco has chosen six elements as indicators of component condition. These are silica (dirt), aluminum (pistons), chromium (chrome-plated liners and water leaks), iron (rings and other parts), copper (bearings), and lead (bearings). When the analysis shows an increase in quantity of any of the indicator elements, the locomotive diesel engine is subjected to whatever maintenance may be indicated as necessary.

At present Alco is testing lube oil samples from 850 locomotives twice a month, in cooperation with the more than 20 railroads involved. In addition, at least 7 major railroads have either in operation or on order a complete spectrographic testing outfit for preparing and testing their own oil samples.

During the past year, improved laboratory and sampling techniques, combined with more accurate interpretation, have increased the efficiency of spectrographic analysis to the point where a majority of the participating railroads report considerable savings in maintenance, repair, and prevention of costly breakdowns. Many railroads are exploring possible extension of overhaul periods through use of spectrographic analysis. In addition, this method has been effective in reducing outages formerly required to determine extent of engine wear by visual inspection. However, it was pointed out that spectrographic analysis is not yet intended to take the place of present inspections and maintenance, but only to supplement them.

A. C. Mengel, chief chemical engineer of Alco, opened the symposium with a historic account of the development of spectrographic methods, following which a technical account of Alco's present laboratory and field methods was given by L. L. Kathan, Alco chemical engineer. One of the points made by Mr. Sennstrom was that spectrographic analysis indicated that some lube oils created a condition where engine wear rates were lower than for other oils. Among the many railroad representatives favoring the continued use of spectrographic analysis for diesel engine maintenance control were: V. E. Amspacher, chief chemist of Pennsylvania Railroad; Fay Thomas, assistant to general superintendent of equipment, New York Central; Wade R. Seniff, engineer of tests, Baltimore & Ohio; W. E. Lasky, engineer of tests, Gulf, Mobile & Ohio; C. C. Mugford, assistant engineer of tests, Southern Pacific; Stanley Crane, engineer of tests, Southern Railroad; W. F. Sinclair, engineer of diesel equipment, Canadian Pacific; and Kenneth Cartwright, general mechanical superintendent, New Haven Railroad.

Mr. Seniff of the B. & O. summarized the general conclusions of the two-day symposium by saying that while spectrographic analysis had already proved itself by the amazing progress made during the past year, the railroads ad manufacturers must capitalize on the use of spectrography as a vital tool which brings good dividends if accurately and intelligently used. Mr. Seniff proposed, as a resolution, that the railroads and manufacturers form a committee headed by Mr. Amspacher of the Pennsylvania Railroad to determine standard laboratory techniques and tolerances for formal submission to the American Society for Testing Materials, which would then establish these spectrographic standards for the railroad and locomotive industries.

THIS ANNOUNCEMENT is to inform you that we are in a position to erect, service and maintain large bore Diesel Engines. We are experienced in emergency repairs of all types, our services also includes jacket and raw water problems, fuel and lube oil applications together with piston ring problems, we can "Square Up" your worn piston ring grooves. We are journeymen machinists and eventually will be tooled up to handle any type of machine work including metal application to worn engine parts, we can also help you with your pump problems.

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Snow-Nabstedt Issues Folder

The Snow-Nabstedt Gear Corporation, Hamden, Conn., has issued a four-page folder, the first of its kind illustrating industrial, farm, and construction machinery driven by engines equipped with S-N Industrial Reduction Gears. It shows a few of their many possible applications including bridge-raising, pumping, dredging, quarrying, ditching, and sand pit dragging. The folder describes the part played by heavy duty S-N Industrial Gears in transmitting full power from the engine to the load at the most economical or necessary speed for the driven equipment.

It also contains photographs illustrating the steps taken in designing, manufacturing, testing, and inspecting gears at the Snow-Nabstedt Gear Corp., which has been in operation for 47 years. Copies of the folder and specification sheets for the complete Industrial Gear Line can be obtained by writing to the company at 222 Welton Street, Hamden, Conn.

Canadian Tug

The tug *Bansaga*, powered by a 600 hp. Atlas Imperial Marine Diesel engine, is described as the most powerful tug of its class on eastern seaboard of Canada. Marked with two narrow green and wide white stripes on its funnel, the tug is a familiar sight from Yarmouth, N. S., to Port Alfred, Quebec, along the St. Lawrence River. If there is a tough job to do, such as docking a 10,000 ton freighter when a good strong northeaster is blowing, the tug does it with power to spare. And when there's a *Queen Mary*, *Queen Elizabeth*, or *Ile de France* to dock, the *Bansaga* can be seen standing out among the rest of the tugs. Built in 1943 by Russel Brothers, Ltd., Owen Sound, Ont., as the RCN *Glenlea*, the tug was purchased by Foundation Maritime, Ltd., in 1947, and given its present name. At that time an 8 cylinder, 9 in. x 12 in. 320 hp. engine was installed, but did not provide sufficient power for the type of work. In 1949, the tug was repowered with a model 6 HM, 15 x 19-in., 6-cylinder 600 bhp. Atlas Imperial Diesel engine, made by The National Supply Co.

WANTED

A 15 or 20 c.f.m. air compressor 65 to 100 p.s.i. driven by an electric motor. Send full details with condition to Box 505, DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, Calif.

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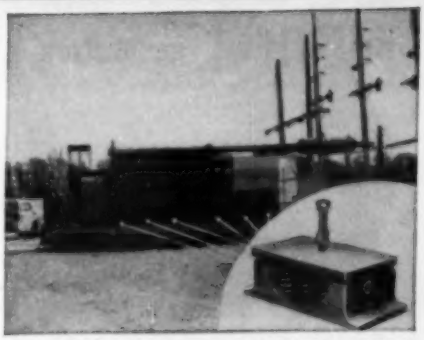
The finest isolation is provided by steel spring isolators. Vibration is absorbed by the steel springs, and thrusts are controlled by resilient chocks. For less critical installations, cork and rubber materials are available.

For more information, see our page in the "Diesel Engine Catalog" for 1952; our catalog G-104 in Sweet's Files; or write us for copies—yours for the asking.

Special recommendations on request, without obligation. A half century of experience is at your disposal. Representatives in principal cities.



Baldwin 550 H.P. diesel generator mounted directly on Korfund steel-spring isolators without special foundation on this truck trailer. The Vibro-Isolators were also used to prevent distortion of the engine generator as the truck twisted when traveling over rough fields. Rural Cooperative Power Ass'n, Elk River, Minn.

A Few Typical Installations:

Bangor Hydro-Electric Co., Bangor, Me.....6 1425-hp. Nordberg
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2 Park Avenue, New York.....4 450-hp.; 1 750-hp. Worthington
New Yorker Hotel, New York.....1 550-hp.; 1 750-hp. Busch-Sulzer
Macy's, New York.....1 700-hp. Alco
Floyd Bennett Field, New York.....1 450-hp. Fairbanks-Morse
Prudential Insurance Co., Newark, N. J.....1 700-hp. Baldwin
Lone Star Gas Co., Dallas, Texas.....1 400-hp. Cooper-Bessemer (Gas)
Sun Oil Co., Marcus Hook, Pa.....4 250-hp. Ingersoll-Rand (Gas)

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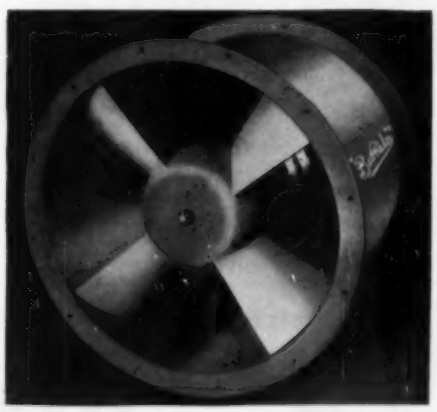

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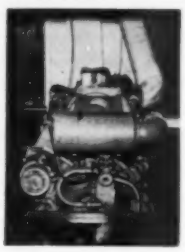
Building Near Completion

Erection of a new building for housing two new 18-ton capacity electric steel melting furnaces for the Chicago plant of Ingersoll Products Division of Borg-Warner Corporation is nearly completed, R. S. Ingersoll, divisional president, announced. Recent steel shortages and the high price of premium steel have prevented the company from meeting the demand for its agricultural and automotive products. The new furnaces will help assure a steady supply of steel. They will also make it possible to control the quality of steel to exact requirements. The new building to house the furnaces is being built just west of the plant's office building and will be 460 feet long and 80 feet wide. Two cranes will be installed in the building, both with capacities well over safety requirements. A complete new power distribution system will also be installed to furnish 12,000 volts for operation of the furnaces. The system necessitates installation of a new 12,000 volt power line from Roseland substantion to insure an adequate supply of electric power. In connection with the power system, Ingersoll has spent $200,000 for equipment which is not necessary to the process, but will eliminate conflict with television, radio, and other electrical service to homeowners in the area.

When the new equipment goes into operation at Ingersoll, 100 new jobs will be created. The furnaces will operate around the clock on a three-shift basis, 30 days a month. It is estimated that about 240 tons of steel a day can be poured from these new units. The furnaces will be charged with scrap iron and steel, which will be available from the company's regular operations at its Chicago and Kalamazoo plants. Fumes and dust from the furnaces will be eliminated by an electrostatic type dust collector. Ingersoll is one of the first companies in the country to arrange for installation of this type of system in connection with electric furnaces. The company will spend approximately $85,000 for this equipment, which is guaranteed to remove 95% of all fumes and smoke and to keep the surrounding area twice as clean as the city's smoke regulations require. All the new equipment has been designed with safety factors beyond those ordinarily used. Special safety devices for the men who will work in the department will be furnished by the company.

Combination Fishing Boat



The *Alma J*, a new combination fishing boat, was launched recently at Seattle and has been put to work in North Pacific waters by her owners, Captains Stanley and Sverre Johansen and John Lervold of Seattle. Designed by Olaf Nielsen and built at the Sagstad Shipyards in Seattle the boat is 58 ft. overall, has a beam of 16 ft. 4in. and a draft of 7 ft. 5 in. She has a payload capacity of 60,000 pounds and tankage for 3100 gallons of diesel fuel and 550 gallons of fresh water. The power plant is a two-cycle model 6-110 General Motors Diesel which turns a 54 x 44 propeller through 4.38 to 1 reduction. The craft can be operated by hydraulic controls both from the pilot house and the flying bridge. She has a cruising speed of 9.5 knots at 1450 engine rpm. According to Capt. Stanley Johansen, the craft's skipper, the compact size of the two-cycle diesel was an important factor in its selection for the *Alma J*. Although it delivers adequate power at less than its maximum rpm. it occupies relatively small space. This reduced the size of the engine room required and increased the space available for crew quarters and payload.

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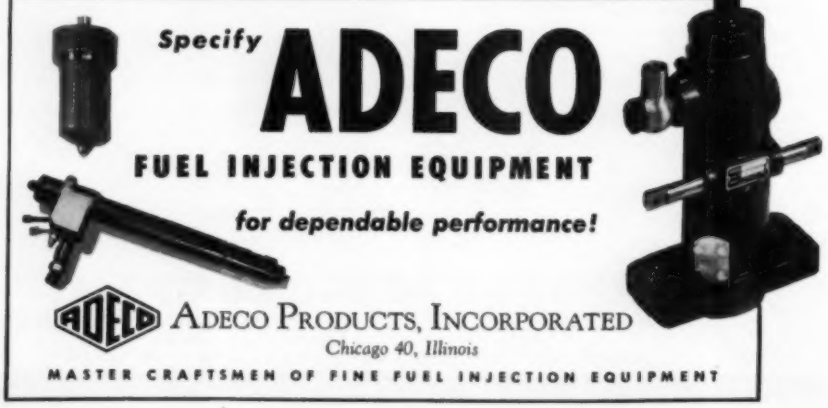

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West Coast Diesel News

By FRED M. BURT

PURCHASED FROM Buda Engine & Equip. Co., Los Angeles, by Valley Crane & Rigging Co., Bakersfield, a 185-hp. Buda diesel engine to replace a gasoline engine, to provide power for a Motocrane.

SOLD BY Bethlehem Supply Co., two 40-hp. Waukesha natural gas engines, direct-connected to centrifugal, single-stage, double-suction Fairbanks-Morse pumps to provide circulation of compressor cooling water at a pumping station of major oil company in the San Joaquin valley.

FOR JOHN W. STANG CORP. (Los Angeles) wellpoint, unwatering service on Fluor Corp. construction job, Wood River, Ill., two 150-hp. General Motors diesels from Anderson-O'Brien Co., Los Angeles to power 8 in. Gardner-Denver centrifugal pumps.

THE NEW manager of Shepherd Marine, San Pedro is Dick Watson who started his 23 years of marine and industrial Caterpillar diesel experience with a Santa Barbara dealer in 1930, then to Shepherd; to Vega Aircraft during the war gaining valuable electronic experience; back to Shepherd in 1946. He succeeds Geo. Nichols, with Shepherd since 1927, who died of a heart attack March 8, 1952.

THE LARGE Monterey purse seiner *C. R. Martinolich*, powered with a 400-hp. Enterprise diesel engine, has been purchased from Vince Cefalu and partners, by Wm. Diamond, Seattle, for use as a cannery tender.

A NEW 5,000 gal. water truck for use by contractors Macco Corp. and Morrison-Knudsen on their Isabella Dam, Kernville (Calif.) joint venture, has a Sterling chassis powered with a 280-hp., 6-cyl. Buda diesel, driving through a 17 in. Schneider torque converter.

POWERED WITH a 190-hp. Murphy diesel supplied by Alaska Pacific Supply Co., also with 3:1 Twin Disc reverse and reduction gear and front power take-off, is the new *St. Janet*, 57 ft. (Alaska limit) seiner built by Harold Hansen Boat Co., Seattle, for Walt Hossfeld.

DESIGNED BY Robt. Allan, Vancouver architect, the 80 ft. fishboat *Gail Diane*, with a 6-cyl. 260-hp. (@390 rpm.) Washington diesel for power plant, was built at W. R. Menchions' shipyard, Coal Harbor, Vancouver, for Capts. John Bordewick and Joe Gregory.

Using, for the first time, diesels for fishing skiff lights, the *Sunbeam II*, Lonnie Williams' new 18 x 8 skiff; and the *Donna K*, Herb Mueller, five 16 x 6 skiffs, all use Crofton 5-hp., 3-kw., diesel-generating plants.

PROMOTED FROM Shop Foreman, Frank Chalupnik, after eight years with the company, is now Sales Manager of Shepherd Marine, San Diego; succeeding Webb Hurt.

FOR USE at the Signal Oil and Gas Company gasoline plant at Huntington Beach, Calif., a new 660-hp. natural gas engine driven Clark compressor.

FOR USE AS intermediate boosters on the Southern California and Southern Counties Gas Companies' 30 inch natural gas pipe line between Blythe and Los Angeles, two 5000-hp. natural gas combustion turbines have been purchased to drive centrifugal compressors.

PURCHASED FROM Engine Sales and Service, Los Angeles, a 3-cyl. 75-hp. P&H diesel engine to power the *South Wind*, a 38 ft. Kettenburg tuna boat operating out of San Diego; also equipped with a Twin Disc 3:1 reduction gear.

FOR USE by the Continental Oil Company for their pressure maintenance program on the Grubb lease at Ventura, three 660-hp. natural gas engine driven Clark compressors.

THE Seward Electric System, Seward, Alaska, held open-house May 25th., so the local town people could see the new Cooper-Bessemer Model LS-6-T, 800-kw. diesel-generating unit just installed, and supplied by the Seattle branch of the Cooper-Bessemer Corporation.

THE T. M. PAGE CORP., Monrovia (Calif.) contractors have recently repowered seven Super C Tournapulls with 6-cyl., 215-hp. Buda diesel engines.

NEED A TRAINED DIESEL TRACTOR AND HEAVY EQUIPMENT MAN?

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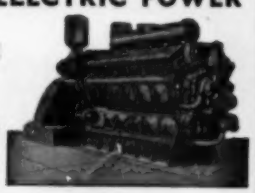

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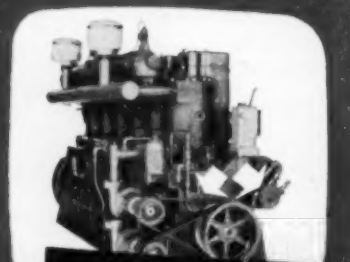

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The Elliott turbocharger which packs maximum power into the Cummins Diesel Special.

● The Cummins Diesel Special in its qualifying run at the Indianapolis Speedway broke all previous lap records with 139.104 miles per hour for a single lap, and an average of 138.010 for four qualifying laps.

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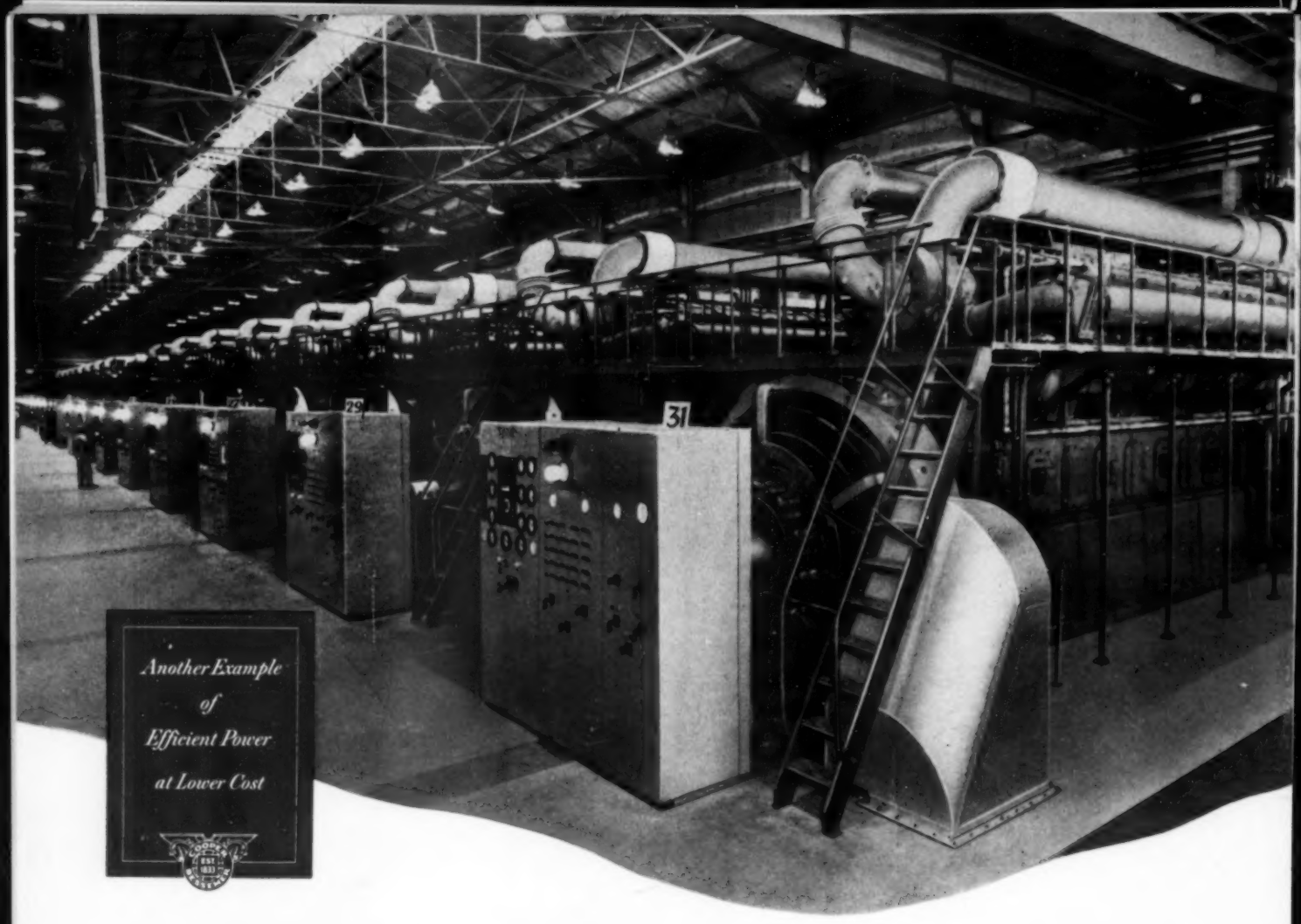

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